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THE

# AGRICULTURAL GAZETTE

. . OF . .

### NEW SOUTH WALES.

The Hon. H. V. C. THORBY, M.L.A.

MINISTER OF AGRICULTURE.

K. SYNNOTT, Editor.

### By Anthority:

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Agricultural Gazette of New South Wales.

### Methods of Establishing Improved Pastures.

A. W. S. MOODIE, H.D.A., H.D.D., Assistant Agrostologist,

STOCKRAISERS in Australia depend on the productivity of the natural pastures to a greater extent probably than do graziers in any other important stock-raising country in the world. As a large proportion of our national income depends directly on the pastures, it is not surprising that great interest is now taken by the majority of graziers in ways and means of maintaining and improving the carrying capacity of their pastures.

In New South Wales, climatic conditions range from the sub-tropical, with a liberal rainfall, to the cold of the southern tablelands and the areas of restricted rainfall on the slopes and in the western division. It will be readily understood that each district presents its own particular problems, and graziers should become familiar with methods of pasture improvement applicable to their own district before embarking upon operations on a large scale.

### Ways in which Pastures can be Improved.

Some of the pasture problems to be dealt with may be briefly summarised as follows:—

- (1) Improvement of the carrying capacity of the poorer classes of country, and of areas which have become denuded of grasses and useful plants on account of rabbits, overstocking, and drought.
- (2) Provision of winter grazing in cold districts, and summer grazing in districts poorly supplied with native grasses, but with ample winter feed provided by herbage.
- (3) Maintenance of the fertility of pastures, particularly in the older districts, but also in any districts where close grazing is carried out.
- (4) Establishment of drought resistant grazing areas, such as those provided by lucerne.

To obtain the maximum returns from money invested in improving the pastures it is essential to study the deficiencies of the existing pastures and to adopt the form of improvement most likely to meet with success. Procedure will depend entirely on circumstances. As with the majority of crops, the establishment of grasses depends to some extent on prevailing season conditions, but the use of the right pasture plants for the avoid the disappointment of failure, and the eliminate those I was which

elle

### The Methods Employed.

The following methods of improving the pastures have been used on a commercial scale in various parts of the State with good results:—

- (1) Ploughing and working down the land and sowing mixtures of grasses for permanent pasture. This method has been found very successful on the tablelands and coastal areas, and, with modifications to suit local conditions, in the wheat districts. A fine seedbed should be prepared and weed growth controlled whilst the land is in fallow. If the resultant pasture is free from weeds it will provide more feed and be more permanent.
- (2) Broadcasting grass and clover seed on the pasture and providing cover for the seed by harrowing. This operation may be carried out during top-dressing by mixing the seed with the fertiliser. Free germinating seeds, such as Perennial Rye grass, Wimmera Rye grass, Sheep's Burnet and Subterranean clover, can be readily established by this method in suitable districts.
- (3) Distributing seeds of suitable grasses and clovers round fallen timber, dug-out rabbit burrows or any other places providing cover for the seeds.
- (4) Allowing native grass or saltbush areas to form seed periodically, resulting in the thickening up of the pasture.

Where any doubt exists as to the most profitable and practicable scheme to adopt the composition of the existing pasture will help to decide the issue. Where the native pastures are composed of useful plants, such as Wallaby grasses (Danthonia spp.), Panic grasses (Panicum spp.), Star or Windmill grasses (Chloris spp.), Ball or Cluster clover (Trifolium glomeratum), Burr clover or trefoil (Medicago denticulata), it may be unprofitable to use the plough. Where these plants appear in the pasture in fair quantity, top-dressing would give excellent results and be more profitable in most districts than ploughing and sowing grass mixtures. Superphosphate will encourage the growth and seeding of the above plants, and the nutritive value of the feed will be increased.

On areas where the useful native grasses have disappeared and where weeds and other useless plants predominate, re-grassing is necessary, and the method employed will largely depend on the type of country. If the soil is free working it may be possible to incorporate vigorous-growing free-seeding plants in the pastures by distributing and harrowing in the seed. On heavy, stiff soils, however, ploughing will be necessary. On the coast, tablelands, and districts where it is intended to establish grass mixtures consisting of *Phalaris bulbosa*, Tall Fescue, Tall Oat, Cocksfoot, unial Rye, &c., the ground should be ploughed and properly cultivated.

the wing of pasture plants with the last crop of practise in some districts.

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1st January, 1930.

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grass, Subterranean clover, and lucerne are frequently used for this purpose. As a general practice, however, this method cannot be recommended, as the cereal will draw freely on the soil moisture during the spring to the detriment of the grasses or lucerne. When carried out the rate of seeding of the wheat should be reduced to about half the normal quantity.

On the north coast when sowing mixtures on paspalum land to provide winter feed, ploughing the paspalum and preparing the land gives the best results, but plants such as White clover, Sheep's Burnet, Red clover, and Italian Rye grass can be established by broadcasting on the unploughed paspalum and harrowing the seed in.



A Perennial Rye Grass Pasture sown on well-prepared land, Gerringong District.

Note the freedom from weed growth eighteen months after sowing.

### Preparation of the Soil.

Where permanent pastures are to be established, consisting of perennial grasses and clovers, which should provide feed for many years, a thorough preparation of the soil is necessary. The reasons for this are:—(1) The seeds of most pasture plants are small, the cost is comparatively high, and a fine seed-bed will give the best germination; (2) a permanent pasture should occupy the ground for a number of years, and a thorough preparation is essential to destroy weeds and conserve moisture in order to give the young plants a good start.

With plants such as Wimmera Rye grass and Subterranean and other annual clovers, good results can be obtained in many cases without any special preparation of the soil beyond discing or cultivating a short time before sowing.

Deep ploughing is not necessary for establishing grasses, but the seedbed should be firm and the use of the packer or roller may be necessary on open crumbly soils to achieve this end. On parts of the Dorrigo and northern tablelands it may be very necessary to roll these loose soils both during the formation of the seed-bed and after sowing.

### Time of Sowing.

This is of the greatest importance when laying down pasture areas, and depends mainly on two factors: (1) The grasses and clovers being sown, and (2) the climatic conditions prevailing in the district.

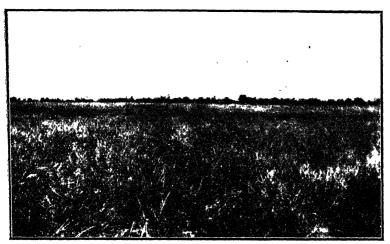
The grasses and clovers commonly used for pasture purposes can be broadly classified as follows:—

- (1) Annuals, which are purely winter and spring growers, such as Wimmera Rye grass, Italian Rye, Prairie, Subterranean clover. English trefoil or Black Medic, Ball clover, Burr clover, and Egyptian clover. These must be sown in the autumn or early winter in every district to ensure success. Spring sowing invariably results in failure. Although a satisfactory germination may be obtained in the spring, the advent of hot weather will kill off the plants before they form seed.
- (2) Perennials which are principally winter growers, such as the "English grasses" (Perennial Rye, Cocksfoot, &c.), the perennial clovers (Red, White, &c.), the Danthonias, and Sheep's Burnet. To obtain best results these should be autumn sown, although in districts where the spring and summer months are cool and have a good rainfall, success will often be met with where spring seeding has been carried out. This applies particularly in the colder portions of the southern tablelands.
- (3) Annuals, biennials, and perennials, which are summer growers and which are sown in the later winter and early spring, such as Sudan grass, Teff grass, Bokhara clover, Rhodes grass, paspalum (dilatatum and compressum), Couch, and the native grasses such as the Panicuus.
- (4.) Lucerne.—This valuable pasture plant should be sown in the autumn, but in districts where winter-growing weeds are likely to prevail against the young lucerne, or where the winter months are extremely cold, spring sowing may be favoured. Where winter weeds are likely to be bad a long fallow and thorough preparation of the soil should enable the lucerne, when sown during the autumn, to hold its own against weed growth.

If the above directions are adhered to, the question of the district conditions may be taken to be of secondary importance if plants suitable to the district have been selected for sowing. There are a few exceptions, however, notably the northern and southern tablelands. In these districts and similar areas where the winters are particularly severe, autumn sowings should be carried out as early as possible, say in February on early March. This will enable the young seedlings to make fair growth before the cold weather. Although the English grasses, clovers, &c., used

for pasture purposes in tableland districts are referred to as frost resistant, in the seedling stage the young stems may be broken off by the lifting action exerted by heavy frosts on the soil. Where the winter conditions are moderate autumn sowing of grasses and clovers may be continued well into June. Even on the northern tablelands good results are obtained with June sowings of *Phalaris bulbosa*.

In districts where the seasonal rains are fairly regular, sowings of pastures should be arranged so as to obtain the maximum benefit from those rains. With lucerne it is particularly important, especially in regions of comparatively light rainfall, to delay sowing until rain has fallen. In the majority of cases, sowing lucerne in a dry seed-bed and waiting for rain to germinate the seed does not give good results. It has been found



Wimmera Rye Grass Sown at 4 lb. per acre with Wheat in 1925, Nyngan Experiment Farm.

Photograph taken in 1927.

at Trangic Experiment Farm that by waiting for rain and sowing immediately afterwards a good germination is assured, the plants quickly become established and are able to withstand harsh conditions which may follow. If this practice is adopted it will be possible to sow even as late as July in the drier districts where a spring sowing cannot be recommended. If the land has been fallowed and properly prepared, sowing can be carried out immediately after rain. When the preparation of the land is delayed until rain falls, the maximum benefit is not obtained from the precipitation.

### Selecting Pasture Plants to Suit Soil Conditions.

Although some pasture plants can be established on all classes of soils, provided the rainfall conditions are favourable, certain soils are more favourable to some plants than to others. For example, lucerne prefers a soil which offers no obstacle to its deep-rooting habit; Subterranean clover

favours light soils, and in some districts it appears to be impossible to establish this clover on the heavy black soils; on the northern tablelands *Phalaris bulbosa* gives excellent results on the black soil, but is not nearly so prolific in growth on the lighter soils, where good results are obtained from plants such as Cocksfoot, Tall Oat grass, Tall Fescue, Sheep's Burnet, and Perennial Red clover. The departmental publication, "Grasses for Different Districts," has been compiled with a full appreciation of these facts, and the recommendations given should be followed when formulating pasture improvement operations.

### Rate of Seeding.

It is not within the scope of this article to discuss pasture mixtures for various districts, and the reader is referred to the various departmental publications available on this subject. It is pointed out, however, that heavy sowings of grasses and clovers are usually expensive, unnecessary, and wasteful. The departmental recommendations on this subject are based on the results of years of investigational work throughout the State.

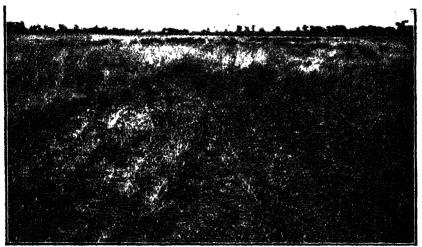
### Methods of Sowing Grasses and Clovers.

The method usually adopted for sowing these seeds is to mix the seed with 56 lb. to 1 cwt. superphosphate per acre and sow through the manure box of the wheat drill. The seed and fertiliser should be well mixed prior to sowing, and whilst the drill is being used the mixture in the manure box should be stirred occasionally to prevent the seeds from rising to the surface. Failure to observe this will result in an uneven distribution of the seed. It might also be mentioned that the seed and superphosphate should not be mixed together for more than thirty-six hours prior to sowing. It has been repeatedly noticed that where seed and fertiliser have been mixed, and sowing has been delayed on account of rain or other causes, germination has been poor, and this fact has been confirmed by experiments carried out in the seed testing laboratory. It is advisable, therefore, to mix only sufficient seed for use the following day. When the wheat drill has a grass seed lox attachment this may be used effectively for distributing the seed, and the fertiliser can be distributed in the usual way through the manure box of the drill.

When sowing with the wheat drill care is necessary to sow the grass seed at the correct depth. Generally speaking, sowing at the same depth as for wheat will result in a faulty germination. Grass and clover seed require very light covering, and consequently the discs or hoes of the drill should be set to run on the surface of the ground. Light harrows may be attached to and drawn behind the drill to provide sufficient covering for the seed. On open volcanic soil, where it is difficult to compact the soil, a good germination is usually obtained by sowing the seed on the surface and then rolling the area. On soils of this type it is a good practice to use sheep to clean up the fallow prior to sowing in order to compact the soil as much as possible. The sheep may be left on the area until sowing is completed. On

average soils, if sheep are used to cover the seed, a large number should be driven over the land fairly quickly. It is undesirable to leave them in the paddock for any length of time, as they will compact the soil too much.

In the southern districts it is a common practice to sow seeds such as lucerne, Wimmera Rye grass, or Subterranean clover with the last crop of wheat in order to provide good grazing land after the wheat is taken off. When establishing a pasture by this method it will frequently be found advisable to make two sowings, the pasture plants and the wheat each being sown at the correct depth. If the fallow is in good condition, with ample moisture close to the surface, the work may be done in one operation, as a shallow sowing of the wheat should be satisfactory under these conditions.



Wimmera Rye Grass sown with the "Combine" on Uncultivated Native Pasture Land, Temora Experiment Farm.

On the coast many farmers sow seed of grasses and clovers between the rows of a crop such as maize if they intend throwing the paddock out of cultivation for a number of years. The pasture mixture is distributed in the autumn and cultivated in with a single-row cultivator. By the time the maize is ready to take off the grasses are usually well established and a useful pasture is thus formed.

### Sowing with the Fertiliser Distributor or Broadcaster.

Much may be done in the way of incorporating useful plants in the pastures by broadcasting free-germinating seeds suitable to the district (e.g., Perennial Rye, Cocksfoot, Wimmera Rye, Subterranean clover, Black Medic or English Trefoil (Medicago lupulina), Burr clover (Medicago denticulata), Ball clover (Trifolium glomeratum), and White clover) with the superphosphate during top-dressing operations. In this way the carrying capacity of the pasture is increased and plants producing winter feed can be worked in among summer-growing grasses. On areas where unclosed

grasses are dominant and there are no clovers, little apparent result may be observed from top-dressing until clovers or medics are introduced on to the area in the manner just described.

Where the above practice is adopted the plants are sometimes a little slow in becoming established and for the first season will not show the same growth as would be expected on well-prepared land, but when they become established a great improvement in the pasture may be anticipated. When broadcasting seed in this way it is advantageous to follow the operation by running a harrow over the area, if possible to do so, thus ensuring ample covering for the seed as well as breaking the surface of the ground and stimulating the growth of the plants already established. With plants such as Subterranean clover and Winmera rye grass good results can be expected, however, without the harrowing.



An Excellent Stand of Mixed Grasses Sown with a Wheat Drill on old Cultivation Land, Boorowa.

On properties where the paddocks are large and subdivision a costly proposition, cultivating narrow strips through the paddocks and the sowing of suitable free-seeding grasses and clovers or lucerne can be carried out. Wimmera Rye grass, Subterranean clover, or native grasses will soon spread if established in this way in the first instance.

### The Hand Broadcaster.

This implement, commonly found on coastal farms, can be used for sowing grasses and clovers. With mixtures of grasses and clovers totalling about 20 lb. seed per acre an even distribution of the seed can readily be obtained. When the quantity of seed is small, say, 3 or 4 lb. seed per acre, the best results will be obtained by mixing the seed with superphosphate or dry sand. Needless to say, this method is neither congenial nor efficient in windy weather.

# 5 SPECIALITIES

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### CAULIFLOWER-Yates' Phenomenal Early.

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I am sending you this specimen of Early Phenomenal Cauliflower, one of many of similar size, grown from seed which I purchased from you last year. Personally, I wish for nothing better; they were most profitable.

### CABBAGE—Henderson's Succession (Peter Henderson's own stock).

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When sowing Sudan grass with the wheat drill at 8 to 10 lb. seed per acre, sawdust or bran can be used as a medium for ensuring an even distribution of the seed, or the seed may be mixed with fertiliser and sown through the manure box of the drill.

On old cultivation land, or on soils that are loose or self mulching, the sowing of grass seed can be carried out with the combine without previous preparation of the land, the seed being distributed and worked in during the one operation. Satisfactory results with Subterannean clover, Wimmera Ryc grass, and lucerne have been obtained by this method.

### Sowing Seed on Burns.

This is a popular method of establishing grasses in coastal districts, particularly on volcanic soils. The ashes resulting from the burning of the fallen timber form an excellent seed-bed.

### Sowing on Rough or Timbered Areas.

Where it is impossible to cultivate owing to the nature of the country, sowing seed round fallen timber, in dug-out rabbit burrows, in stump holes, or in any places where cover is provided will be found satisfactory. Subterannean clover, Wimmera, Perennial, and Italian Rye grasses and Sheep's Burnet are particularly useful for this purpose. Many graziers make it a practice to scatter seed in these places when riding through the paddocks, the plants eventually spreading through the pasture.

The use of sheep for tramping in grass seed can be advocated as a fairly efficient and cheap means of covering grass or clover seed that has been broadcast. On large areas this practice is adopted with a good measure of success.

During the course of this article passing reference has been made to various grasses and clovers and their adaptability to various districts and conditions. For definite recommendations regarding pasture mixtures readers are referred to publications available free of charge on application to the Department of Agriculture, Box 36A, G.P.O., Sydney.

### A 70,000,000 BUSHEL HARVEST IN 1930?

"Primary production being our main source of revenue, diminished returns from this source have been largely responsible for the present depression, and the vital importance of bringing about improvement by means of higher production must be apparent to all," stated the Minister for Agriculture (Hon. H. V. C. Thorby, M.L.A.) recently, when appealing to wheatgrowers throughout New South Wales to make every effort to produce at least 70,000,000 bushels at the 1930 harvest. The Minister has promised very liberal assistance to necessitous farmers, and growers who are unable to finance their operations for the coming season are asked to communicate immediately with the Rural Industries Branch of the Department of Agriculture and make known their requirements.

### FITZROY SEED MAIZE CONTESTS, 1928-29.

The Fitzroy seed maize contests carried out each year at Grafton Experiment Farm are doing much to stimulate interest among farmers who are devoting attention to the improvement of this variety by selection. Competitors in this contest forward 5 lb. samples of seed to the experiment farm, and these are sown on a selected and properly prepared area, the Department's Certificate of Merit being awarded for the highest yielding strain.

For the 1928-29 contest the following eight entries were received:-

J. P. Davis, Taree Estate, Taree.—Weighty grain, good type, slightly uneven in size, a little dull in colour, slight traces of weevil and mould.

D. P. Phemister, Copmanhurst .- Poor sample, very much off type (short grain,

uneven in size, dull and streaky in colour); evidence of weevil and moth.

J. Bruchhauser, Camden.-Clean, sound, bright, and weighty grain, a little un-

even in size but a very good sample.

E. H. Ducat, Kempsey.—Clean bright heavy grain; odd grains a little on the

- small size but a very good sample.

  D. J. Dorward, Cundletown, Manning River.—Bright and weighty, somewhat uneven in size; slight evidence of weevil and fusarium (split grains); also contained some broken and mouldy grains and a few damaged by mice. S. Flett.—Uneven in size; a fair amount of small off-type grain (too red in
- colour), 20 per cent. insect-damaged, some mould present: rather poor sample.

  J. W. Sec, Phonix Park, Einton.—Sound, weighty grain, very large and not so

bright as desirable; very slight evidence of mould, otherwise clean.

C. A. Cox, Glenburn, Bellingen .- Good type, somewhat uneven in size, possibly due to insufficient butting and tipping; received in very bad condition, a count showing 49 per cent. of the grain damaged by moth and weevil, principally the

The weather conditions at planting time were unfavourable, no rain having fallen since July, while the late spring and summer months were hot. dry and windy. Storms during December and January gave some relief, but they were generally followed by heat and strong winds. Good falls commenced late in January, and continued throughout the growing season. An early frost pinched the grain, which was loose on the cob at harvesting time. The trial was planted in duplicate, one section on heavy, brown alluvial soil and the other on black alluvial soil. Harvesting took place on 23rd July and 12th August, respectively. The following average yields of the duplicate plots were obtained:—

1	•		bus.	lb.	*				bus.	lb.
E. H. Ducat	***	* ***	90	14 <del>1</del>	D. P. Phemist	er	•••		74	54
J. Bruchhauser			87	0	J. W. Sec	***	***	•••	74	$52\frac{1}{2}$
D. J. Dorward	•••	***	77	$26\frac{1}{2}$	S. Flett	•••	***	***	65	111
J. P. Davis	***	, '** <b>i</b>	. 76	31	C. A. Cox	***		***	64	36
					J. R. F	isher,	Expe	rime	atalis	st.

### THE POTATO A FOOD AND A REMEDY.

THE potato is not only an excellent food, perhaps the best of all foods, but it is a remedy (according to Dr. J. H. Kellogg, in the American Potato Journal). It dissolves uric acid as well as chalk, and is therefore able to cure different forms of gout and rheumatism. . . . If you send your patient to an alkali spring, or if you give him plenty potatoes, the result

### Comparative Grazing Trials on Topdressed Pastures.

THREE YEARS' RESULTS AT MILVALE AND MILBRULONG.

J. N. WHITTET, H.D.A., Agrostologist.

THESE trials, together with one at Parkes, were commenced in the early winter of 1926, when a dressing of superphosphate was made to the natural pasture areas with the object of comparing stocking results with those on unmanured country of similar quality and pasture covering.

The paddocks at Parkes were required for cultivation at the completion of the second year's test, but the residual effects at Milvale and Milbrulong were so striking at this period that it was decided to continue these trials for a further twelve months. In each instance only the one application of superphosphate was made to the top-dressed paddocks during the period of the trials, those at Milvale and Milbrulong receiving 84 lb. per acre, while at Parkes only 56 lb. per acre was applied.



Fig. 1 .- Unmanured Pasture; W. P. Heffernan's, Milvale, October, 1926.

Particulars of the paddocks, composition of the pastures, and details as to stocking of the areas during the 1926-27 and 1927-28 periods will be found in the *Agricultural Gazette*, pages 891-899, December, 1927, and pages 815-820, November, 1928, respectively.

### Milvale.

(Average Annual Rainfall at Stockinbingal for Seventeen Years, 18.42 Inches.)

The top-dressed paddock of 140 acres on Mr. W. P. Heffernan's property, "Glen Oak" was portion of a 240-acre area that was subdivided, leaving 100

The unmanured paddock at the completion of the second year's test showed 20 per cent. more bare patches and 14 per cent. more weeds, also 15 per cent. less Burr clover (Medicago denticulata), and 20 per cent. less Ball clover (Trifolium glomeratum) than the top-dressed area.

The stocking of the areas for the twelve months' period ended April, 1929, was as follows:—

Mont	th.	Sheep carried on 100 acres Unmanured	Slicep carried on 140 acres Top-dressed.	Mon	th.	Sheep carried on 100 acres Unmanured	Sheep carried on 140 acres Top-dressed.
June July August September		. 125 . 125 . 125 . 125 . 125	210	1928. December 1929. January February March April		100 100 100 100 Nil.	240 240 240 240 Nil.

The figures denote that, although it was possible to increase the number of sheep on the top-dressed area in October, 1928, the stocking of the check area was stationary until December, when twenty-five sheep had to be removed owing to feed shortage. The carrying capacity of the unmanured paddock was 1.1 sheep per acre per annum, while that of the top-dressed area was 1.5 sheep per acre.



-Pasture treated with 84 lb. Superphosphate per acre; W. P. Heffernan's, Milvale, October, 1926 This photograph shows the response made to the fertiliser during the early part of the trial.

Owing to a water shortage in March, 1929, it was necessary to remove the sheep from both paddocks on 1st April. At that time there was still a good bulk of dry feed available in the top-dressed area, and the animals were in excellent condition compared with those in the unmanured section. The feed shortage in the unmanured paddock was becoming evident in February, When the sheep were shorn in October, 1928, the wool from the treated area showed better condition than the check paddock, but carried considerably more burr.

The rainfall at Milvale for the period under review was the lowest recorded during the progress of the three years' operations:—

1928.	Points.	1929.	Points.
May	66	January	33
June	121	February	68
July	208	March	191
August	107	April	56
September	58	j <sup>,</sup> -	
October	112	Total	1,040
November	20		•
December	Nil.		

From the above table it will be seen that the rainfall during the hottest months of the year, November to February, was only 121 points, and despite this fact the feed in the top-dressed paddock was able to maintain the increased number of sheep throughout the duration of the trial, whereas the number had to be reduced on the untreated area.

It was noted at the conclusion of the trial that the top-dressed paddock still showed to advantage, as it carried a good coating of dry feed and seed of Burr clover, while the feed on the check area was scanty and showed many bare patches.

### Milbrulong.

(Average Annual Rainfall at Lockhart for Twenty-seven Years, 18.17 Inches.)

The two 80-acre paddocks used in this trial carried a good covering of Wallaby grasses (Danthonia semiannularis and D. racemosa), Burr clover (Medicago denticulata) and Ball and Hop clovers (Trifolium glomeratum and T. procumbens). In this test the response made by Ball clover to top-dressing was phenomenal in good seasons, but when the autumn and early winter rainfall was below the average Burr clover then demonstrated its particular usefulness in producing some feed even under extremely dry conditions.

The following is a record of the stocking of the two paddocks:-

STOCKING of Top-dressed and Unmanured Pastures at Milbrulong.

Month.	Sheep carried on 80 acres Unmanured.	Sheep carried on 80 acres Top-dressed.	Month.	Sheep carried on 80 acres Unmanured.	Sheep carried on 80 acres Top-dressed.
1928. May (17th to 31st) June July August September October	160 160 160 Nil	250 250 250 200 240 240 240	December 1929. January February March April May (1st to 16th)	120 100 100	240 NH. NH. 240 240 240

On the top-dressed area the carrying capacity was at the rate of 2.5 sheep per acre per annum, whereas that of the unmanured paddock was only 1.3 sheep per acre per annum.

The rainfall at Milbrulong for the twelve months' period of the trial was as follows:-

1928.	Points.	1929.	Points.
May (17th to 31st)	80	January	35
June	103	February	163
July	170	March	93
August	14	April	175
September	112	May (1st to 16th)	58
October	282	• • • • • • • • • • • • • • • • • • • •	
November	18		1.328
December	25		

As was the case at Milvale, the rainfall was the lowest recorded during the three years the trial had been in progress, the precipitation during the summer months being particularly light.



Fig. 8 -Unmanured Paddock at Gollasch Bros , Milbrulong, October, 1926.

At the conclusion of the grazing test, it was found that the top-dressed area was in a much better condition as regards pasture covering than was the case when the trial was begun in 1926. Though conditions were dry at the conclusion of the trial, there was an abundance of Burr clover present in the top-dressed paddock, although the plants were small and affected by the dry season; on the other hand very little clover was to be seen on the unmanured area, and the sheep from this section were not in as good condition as those in the other paddock.

### Increased Returns from Wool.

Mr. Gollasch had received such excellent results from his pasture topdressing operations that, at the 1928 shearing, it was decided to class and market the clips of the two lots of sheep separately. The sheep on the top-dressed area cut on an average of .7 lb. more, and the wool realised ½d. per lb. more than that obtained from the unmanured paddock. The average price per pound of the wool from the unmanured paddock was 16½d.

The average return per head for wool from the sheep in the two paddocks was:—

Top-dressed area Unmanured area	•••	 	 	s. 6 15 14	d. 10‡ 5‡
Incre	92.50	 	 	1	<u> </u>

### Summary of Results.

The average figures, covering three years' results at Milvale and Milbrulong and two years' results at Parkes, are shown in the following table:—

	Milvale.				Milbrulong.				Parkes.		
	1926-7	1927-8	1928-9	Aver- age for 3 years.	1926-7	1927-8		Aver- age for 3 years.	1926-7		Aver- age for 2 years.
iheep per acre— Unmanured area Top-dressed area Percentage increase in carrying capac- ity from top-	1·4 2·0	1.0 2.8	1·1 1·5	1·16 2·40 106·9	1·3 3·8	2·2 4·4 	1·8 2·5	1-60 3-57 123-1	2·2 3·5	1·1 1·6	1.65 2.55 54.5
dressing. Rainfall in inches	12.58	23.85	10.40	15-61	15-22	22.37	13-28	16-95	15-49	20-78	18-18

The average annual rainfall at both Milvale and Milbrulong over the three-year period under review was less than the average for those districts.



Fig. 4.—Pasture treated with 84 lb. Superphosphate; Gollasch Bres., Milbrulong.

When this photograph was taken (October, 1926), the improved growth due to the fertiliser was very marked.

The increase in the carrying capacity in each case was considerable, especially when it is realised that only one application of fertiliser was made during the progress of the trial, and as that was made at the beginning of

the trial, it indicates that the residual effect of a fertiliser such as superphosphate is in evidence for a greater period than twelve months.

Owing to the heavier stocking of the top-dressed areas, those pastures benefited from the extra deposits of sheep droppings, which contributed towards the extra growth obtained.

In districts similar to those in which the tests were conducted, § to 1 cwt. of superphosphate per acre should be applied in the autumn of at least every second or third year.

### JUVENILE LIVESTOCK CLUBS IN CANADA.

THE organisation of boys and girls' livestock clubs in Canada has proved to be a factor of greater influence than was ever looked for. To-day, in all provinces from coast to coast, there are few boys or girls of between 10 and 19 years of age on the farm who are not members of some kind of livestock club.

The work is actively carried on jointly by the Federal and Provincial Departments of Agriculture, each providing 50 per cent. of the prize money awarded and sharing the supervision of the clubs during the first year. The railways through their agricultural departments, the universities through their extension services, and departments of education offer sympathetic co-operation, and little difficulty is experienced in maintaining enthusiasm once such clubs are launched.

Not only is love of livestock and proper methods of care and feeding at an early age to be of untold benefit in later years, but through the children the farmers are reached in a manner that might otherwise be most difficult and not half as effective. A case in point is the swine industry in Western Canada. Boys and girls' swine clubs have done a great deal to stimulate interest in hog breeding in this territory and elevate the standard of animal raised. The Canadian Livestock Commissioner is authority for the statement that these clubs in Western Canada were responsible for the change over from the breeding of the American type hog to the growing of bacon hogs, a move which has been attended with such profitable results, but a step which authorities found it very difficult to get farmers to take of their own accord.

### THE CONSUMER WANTS ONLY QUALITY APPLES.

The day of the small and blemished apple has definitely passed. The present generation of consumers (according to the "Report on the Preparation of Fruit for Market," issued by the Ministry of Agriculture, England) demands apples of quality and will not be put off with an inferior article, no matter the price or origin. Indeed, so much is this the case that supplies of low-grade apples can no longer be fully absorbed at prices which leave a subsistence margin for the grower. For the grower who has failed to keep pace with improvements in production methods and who still produces low-grade apples the outlook is dark; no amount of attractive packing in attractive packages will make scabby apples clean.

Department of Agriculture, New South Wales,

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# 1930 GUARANTEE

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### Varieties of Wheat, Oats, and Barley.

DEPARTMENTAL RECOMMENDATIONS FOR DIFFERENT DISTRICTS.

H. C. STENING, H.D.A., Chief Instructor of Agriculture.

The following are the latest departmental recommendations as to the varieties of wheat, oats, and barley best suited to various portions of the State. Growers are reminded to make early arrangements for supply of seed, and if in doubt as to which variety to sow, they should communicate with the Department of Agriculture.

### WHEAT.

### Coastal Districts.

[Embracing districts which are specially subject to rust.]

For Hay-

Clarendon, Florence, Firbank, Gresley (early maturing varieties).

For Green Fodder-

Gresley, Florence, Firbank, Clarendon (early maturing varieties). Sowing for hay should be made later than for green fodder.

### Northern Tableland.

[Of which Glen Innes is representative.]

For Grain or Hay-

Genoa (early sowing);

Florence (mid-season and late sowing);

Clarendon (mid-season and late sowing).

For Green Fodder-

Cleveland (early sowing);

Genoa (early sowing);

Florence (early, mid-season, and late sowing);

Clarendon (early, mid-season, and late sowing).

### Central Tableland.

[Of which Bathurst is representative.]

For Grain or Hay-

Cleveland (early and mid-season sowing);

Cadia (early and mid-season sowing);

Waratah (mid-season and late sowing);

Gresley (mid-season and late sowing).

For Grain only-

Federation (mid-season sowing);

Canberra (mid-season and late sowing).

### Southern Tableland.

[Of which the Monaro, Crookwell, and Batlow districts are representative.]

### · For Grain or Hay-

Cleveland (early sowing);

Yandilla King (early sowing);

Waratah (mid-season and late sowing).

### South-western Slopes and Eastern Riverina.

[Oi which Wagga, Temora, Wyalong, and Barellan are representative.] For Grain or Hay-

Yandilla King (early sowing);

Turvey (early sowing);

Marshall's No. 3 (early sowing, for more favoured districts);

Nabawa (mid-season sowing):

Gresley (mid-season and late sowing);

Waratah (mid-season and late sowing);

Baroota Wonder (mid-season and late sowing).

### For Grain only-

Union (early and mid-season sowing);

Federation (early and mid-season sowing);

Canberra (late sowing).

### For Hay only-

Zealand (early sowing).

### South-western Plains and Western Riverina.

[Of which Deniliquin, Cargelligo, and Hillston are representative.]

For Grain or Hay-

Waratah (mid-scason sowing);

Gresley (mid-season sowing).

### For Grain only-

Federation (early and mid-season sowing);

Union (early and mid-season sowing);

Canberra (mid-season and late sowing).

### For Grain on Mallee soils-

Currawa (early sowing):

Penny (early sowing);

Nabawa (mid-season sowing).

### Central-western Slopes.

[Of which Dubbo, Gilgandra, Wellington, Cowra, Grenfell, Forbes, and Parkes are representative.]

### For Grain or Hay-

Cleveland (early sowing), especially suitable for the cooler portions of this district, such as Coonabarabran;

For Hay only-

Clarendon (early and mid-season sowing).

Cadia (early sowing), especially suitable for the cooler portions of this district such as Coonabarabran: Yandilla King (early and mid-season sowing): Turvey (early and mid-season sowing); Nabawa (mid-season sowing): Waratah (mid-season and late sowing). For Grain only-Wandilla (early and mid-season sowing); Federation (early and mid-season sowing); Union (early and mid-season sowing): Canberra (mid-season and late sowing). North-western Slopes. [Of which Tamworth and Gunnedah are representative.] For Grain or Hay-Cleveland (early and mid-season sowing), especially suitable for the cooler portions of this district, such as Inverell and Delungra; Currawa (early and mid-season sowing); Yandilla King (early and mid-season sowing); Wandilla (early and mid-season sowing); Nabawa (mid-season sowing); Waratah (mid-season and late sowing); Clarendon (late sowing). For Grain only-Canberra (mid-season and late sowing); Aussie (mid-season and late sowing). North-west Plains. Of which Coonamble is representative. For Grain or Hay-Canberra (mid-season and late sowing); Florence (mid-season and late sowing); Clarendon (early, mid-season, and late sowing). Western Plains. [Of which Nyngan, Trangie, and Condobolin are representative.] For Grain or Hay-Hard Federation (early sowing); Waratah (mid-season sowing): Canberra (mid-season sowing): Firbank (mid-season and late sowing).

### Murrumbidgee Irrigation Areas.

For Hay on the Irrigation Areas-

Marshall's No. 3 (early sowing);

Yandilla King (early sowing);

Turvey (early sowing);

Firbank (mid-season and late sowing);

Gresley (mid-season and late sowing).

### For Grain on Dry Areas-

Federation (early and mid-season sowing);

Yandilla King (early and mid-season sowing);

Union (early and mid-season sowing);

Waratah (mid-season and late sowing);

Canberra (mid-season and late sowing).

### OATS.

The varieties recommended by the Department for the various portions of the State are as follows:—

North Coast.—Algerian (for grazing), Sunrise, Mulga, Buddal.

South Coast.—Algerian, Guyra, Sunrise, Mulga, Buddah.

Central Tableland.—Algerian, Guyra, Lachlan, Mulga.

Northern Tableland.—Reid, White Tartarian, Algerian, Guyra.

Southern Tableland.—Algerian, Guyra, Sunrise, Mulga, Myall.

Monaro.-White Tartarian, Algerian, Mulga.

South-western Slopes and Riverina.—Algerian, Guyra, Belar, Mulga.

Central-western Slopes.—Algerian, Guyra, Belar, Mulga, Buddah.

North-western Slopes.—Algerian, Guyra, Sunrise, Mulga.

Under Irrigation.—Algerian, Guyra, Sunrise, Mulga.

Western Plains.—Sunrise, Gidgee, Mulga, Buddah.

### BARLEY.

The varieties recommended by the Department arc-

Two-row type (commonly called "malting barleys")—Pryor.

Six-row type (commonly called "feed barleys")—Skinless for early winter green feed. Cape and Trabut for green fodder, and grain for stock in the cooler districts.

### Pure Seed Supply.

In each issue of this Gazette is published a list showing where pure seed of the various varieties recommended to farmers may be obtained. These supplies come either from the Department's experiment farms or from reliable farmers in different districts who are concentrating on the selection and improvement of varieties, which are kept pure and maintained or improved in yielding capacity.

### Cereal Maturity.

A. R. CALLAGHAN, D.Phil., B.Sc., B.Sc.Agr., Assistant Plant Breeder.

In the march of agricultural progress, old varieties of cereals are constantly giving place to new, in such a way as to complicate the farmer's task of choosing a variety to suit his specific conditions. Morphological descriptions of all varieties are made readily available and accurately given, but data of paramount agricultural importance are often less accurate, mainly because morphological features, being the more obvious attributes of any variety, are emphasised and the less obvious physiological characters neglected. It is a matter of gratification, however, that a certain physiological bias is reflected in the general recommendations made, and in recent years a definite scheme of classification has been adopted whereby varieties are grouped according to their maturity. Every effort is made to secure a thoroughly reliable statement of the characteristics of a variety, and whilst unanimity is universally reached with regard to descriptive characters, the more recondite physiological characters often form the basis of controversy. Of the latter, the most accessible to study is maturity, but even in this regard the exact definition of early, mid-season, or late is often baffling and, in general, open to criticism. Its importance needs no emphasis here, for without some classification of a pre-eminently agricultural nature, regional recommendations would be practically worthless.

It is a healthy symptom, therefore, to note that every season controversy arises over the relative maturity of certain varieties of both wheat and oats. Whilst one faction maintains that variety X is of the same maturity as the early standard Y, the other is equally emphatic in maintaining a reverse opinion. The farmer will substantiate one view or the other, as a result of his experience during the season, but in the minds of the controversialists the position remains the same. It is certain that the vagaries of climate and locality are in part responsible, but assuming a less insular attitude, it is well to remember that the Australian wheat-belt is governed by general conditions of environment predominantly stable. Under such conditions it is expected that characters of a physiological nature should remain more constant and be more easy of definition than under an environment that has no claim to consistency.

A difference of method largely accounts for these contrary opinions for no special study is required to see how misunderstanding as to comparative maturity of two varieties may arise. The usual method of ascertaining the relative positions of varieties with regard to maturity is not one that accounts for the time required for complete maturation, but one that covers the time required to reach the stage when the first head or panicle emerges; this latter phase is usually referred to as "ears peeping" in wheat and "panicle peeping" in oats. Those not called upon to make such careful relative observations are more apt to accept later phases of development, especially those associated with ripening, such as the charge of colour of

the crop, stages of doughiness of the grain, or even "time to harvest" data as the criteria for determining maturity. Obviously this is mainly a matter of necessity, for in most cases it is impossible for any other than these observations to be made, whereas with the plant breeder or agronomist every-day contact with all varieties is practicable. Granting this, there still appears to be need for a concise account of the methods adopted, together with reasons for their adoption. Further, although the general principle of inflorescence emergence is accepted, it is the purpose of this article to emphasise hitherto neglected aspects, and attempt to place the method on a more reliable basis for acceptance under our conditions.

### Some Factors Influencing Maturity.

A great deal might be written, and indeed has been written, with regard to factors determining maturity without leading to any true physiological conception of what constitutes an early or a late variety. Many ideas have been swept aside by plant breeders who have combined morphological characters, previously thought to be determinants or causations of lateness, with early maturity. There are, however, certain known influences that have a definite bearing upon the length of time required for a given variety to mature, a brief review of which may help clarify the position as well as justify later proposals. Constancy, or the observation of greatest consistency is a primary requirement, and in considering various methods this must determine ultimate procedure.

The time of brairding, that is the date on which the first shoot appears above the surface, often wrongly termed germination, is the earliest contributory influence. This is most often accepted as rigidly correlated with date of sowing, but the time that elapses between sowing and brairding is solely dependant upon seasonal and cultural conditions, and as it is an impossibility, even with advanced methods of cultivation, to control these in such a way as to be constant, it is vastly unfair to measure the commencement of the plant's life from the date of sowing. The past season has been a very significant one from the point of view of comparative maturity and it has emphasised, above all else, the importance of brairding. The intermittent way in which establishment took place had a like effect upon the "ears peeping" notes, for even in 10-link rows differences of from ten to fourteen days were recorded between the "ears peeping" dates of one end compared with those of the other for the same variety. It is only fair to conclude that, whatever the phase accepted as the measure of maturity, it is obvious that brairding dates are important.

The rapidity of growth between brairding and "ears peeping" determines more than anything else varietal differences in the maturity of cereals, and because varietal differences are the chief consideration, this period is of paramount significance. Many workers have concluded as a result of experience substantiated by scientific experiment, that the exsertion of the panicle or ear is not only varietal in character, but is more constant in this respect than maturity itself. Ear or panicle exsertion marks the last phase of growth, and it might be said, therefore, that complete emergence of the

ear or panicle would be a better means of judging, but the ear or panicle immediately comes under the influence of that fickle jade, weather, and in such unreliable hands there is no telling when flowering will set in or for how long it will proceed. Further, length of ear or panicle and the degree of final exsertion are especially variable and offer no such definite morphological change as is afforded by the first emergence of the inflorescence.

From the time of "cars peeping" until maturity there are three factors to consider: (1) The rapidity with which inflorescence exsertion takes place, (2) the time of initial and final flowering, and (3) the rapidity with which the grain develops and ripens after flowering. Whilst all three are correlated one with another, the second is more constant with regard to the first emergence of the inflorescence than either of the others, but all three are profoundly affected by seasonal changes. By way of illustrating the disproportionate effect weather conditions may determine, consider two varieties whose date of heading ("ears peeping") differ to the extent of seven days. Excellent flowering weather such as is assured by warm, fairly humid conditions may prevail to favour the rapid completion of flowering in the earlier variety, whilst a cold change may follow to delay the later variety still more. The reverse may happen, with greater significance, for cold weather may delay the completion of flowering in the early variety to the extent of several days, whilst a change to more amicable weather would quite possibly result in the two varieties completing their flowering about the same time. The inference is clear. Similar circumstances may arise during the maturation of the grain, especially between the time of grain development and its desiccation.

The three phases influencing maturity with which this discussion is concerned are, therefore, sowing to brairding, brairding to initial appearance of the inflorescence, and initial emergence to maturity, and of these the second is less dependent upon external influences than either of the other two. From the foregoing it is obvious, then, that varieties are more liable to reflect the effect of seasonal influences after the time of "ears peeping" than at any time before; this is especially so under the improved conditions of cultivation that prevail to-day, whereby initial growth is made less dependent upon immediate meteorological phenomena.

### A More Reliable Method Suggested.

An experiment was being carried out in the plant breeding plots at Cowra Experiment Farm during the season dealing with general characters of various oat varieties, and owing to the nature of early results it was decided that accurate "panicle peeping" dates should be recorded, with a view to elucidating to some extent at least the question of varietal maturity. For the purposes of this article it is only proposed to deal with fifteen varieties of oats, all of which, according to previous classification were classed as early. Actually in the experiment thirty-seven different varieties are being studied, but as all were sown at the same time irrespective of their earliness or lateness, it would be anticipating trouble to deal with those varieties that were actually sown out of season.

The lay-out of the experiment is given below, each variety being represented by a letter a to z or a symbol "a" to "k." A buffer row of Buddah + was sown first and each subsequent row was guarded at each end by a buffer sowing of Buddah +. Rows were spaced 1 foot apart, and in each were sown eleven varieties plus the two buffer sowings, the grains being spaced 1 foot apart in the rows, so that in rows 2, 3, 4 and 5 the varieties a to k, 1 to v. w to "g," and "h" to g were respectively represented, and so on until each variety was repeated thirty-three times. (In the plan given below the early varieties used in this work are in black type.) In this way, provided all grains germinated, each variety could be studied thirty-three times and in thirty-three different positions on a small area of soil.

LAY-OUT OF THE EXPERIMENT.

1	+	+	+	+	+	+	+	+	+	+	+	+	4-
2	+	а	b	c	d	e	f	g	h	i	j	k	
3	+	1	$\mathbf{m}$	$\mathbf{n}$	0	p	q	ř	s	t	u	V	- }
4	+	w	x	y	Z	"a"	"b"	"e"	"d"	"e"	"f"	"g"	-
5	+	"h"	"j"	"j"	"k"	a	b	c	d	e	f	ħ	4-
6	+	h	i	j	k	1	m	n	0	P	q	r	+-
7	+	s	t	u	V				etc.				

As the experiment was not designed for the determination of maturity, the results of the analysis to follow can only be accepted with caution, for the actual brairding dates of each grain were not recorded, and too few plants were studied to enable fine distinctions being made. The third and fourth leaf-stages, however, were taken and plants not within the model classes when this observation was made were deemed to have delayed their germination and consequently are not herein considered. The period, date of sowing to "panicle peeping," in this instance is known to be relative and of sufficient accuracy for the purposes of illustration.

Having obtained the number of days from date of sowing to "panicle peeping" for all grains considered to have germinated at the same time, an analysis of the figures was made, the results of which are tabulated below.

Variety.					Mean No. of Days to Panicle Peeping.	Difference from Sunrise (in No. of Days).	Difference from Buddah (in No. of Days).
Buddah	***			•••	115.3 + .444	4.4 ± .82	0
Palestine	***	•••	•••	.,.	$115.8 \pm .393$	3·9 ± ·79	0.5 ± .59
Mulga					116-1 ± -728	$3.6 \pm 1.00$	0.8 ፲ .85
Myall		***	***		$116.7 \pm .421$	3·0 ± ·81	1.4 ± .61
Kelvin			***	•••	118·5 ± ·502	1·2 ± ·85	3.2 ± .67
Gidgee		***	• • • •		119·0 ± ·473	0·7 ± ·78	3.7 ± .56
Kelsall's			***		119·5 ± ·484	$0.2 \pm .84$	4.2 + .66
Sunrise				•••	119.7 ± .692	0	4.4 + .82
Laggan	•••	•••			$119.9 \pm .602$	$0.2 \pm .91$	4.6 + .75
Kiah	***				190.0 1 .579	1.1 ± .89	5.5 ± .72
Fulghum	***				101.0 1 .479	1.3 ± .83	5.7 ± .65
Kareela	•••	•••			101.5 1 .501	1.8 ± .90	$6.2 \pm .73$
Kanota	•••				$122\cdot 2 \pm \cdot 542$	2.5 ± .88	6.9 ± .70
Kendall	***				100.0 ( .470	2.6 ± .84	7.0 ± .65
Kurri					194.4 1 .479	4.7 主 .77	9.1 ± .56

The varieties are arranged in the order of their maturity based on the results, and in the last two columns appear the differences expressed in number of days between the maturity of each variety, compared with the two standards Sunrise and Buddah. Significant differences from either of the standard varieties, as expressed by the difference between the two varieties concerned, compared with the probable error of their difference, are in black type. In comparing any variety with either standard, or any two varieties for that matter, if the difference between them is as much as five\* times the probable error of the difference it is quite justifiable to consider the difference as significant.

In this particular case, the probable errors of the figures indicate that the number of plants taken was insufficient to measure with a very close degree of accuracy small differences in maturity. It is suggested, however, that a method based upon the above results and carried out over a period of at least three years would provide the best evidence possible, and go a long way towards final adjudication in the debate on varietal maturity. In view of the results published here it is expedient to recommend a larger number of sowings of each variety; then by biometrical analysis of the results it would be possible to measure differences in the times 'brairding to initial heading" between varieties to within a margin of two days with reasonable certainty. The results of the experiment cited above are only accurate for differences of about four days, but by increasing the number of individuals for each variety the probable errors would be reduced and the reliability of the work enhanced. In future the actual brairding date of each grain sown should be recorded and the period between this and inflorescence emergence determined.

By such a method as described above each plant is considered individually and non-varietal influences, against which it is highly desirable to militate, have a minimum effect upon the ultimate results.

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### THE EAST ANGLIAN PIG RECORDING SCHEME.

We have received from the University of Cambridge Department of Agriculture a copy of the First Report on the East Anglian Pig Recording Scheme.

Pig-recording is a subject which has recently come to the fore as a method of assisting and improving the pig industry in the same way as herd-recording. This report deals with the various methods of pig-recording employed abroad and claims that the East Anglian Scheme is designed to obtain the essential data for the pig-breeder with the minimum of trouble and expense.

There is much in the report that is applicable only to English conditions, but the outlines of the pig-recording schemes are interesting.

<sup>\*</sup>Many workers accept a difference as significant if it exceeds three times the probable error.

#### Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney, not later than the 12th of the month.

```
Wheat-
  Canberra ...
                                      ... W. W. Watson, "Woodbine," Tichborne.
                                      F. Penfold, "Bluevale," Boggabri.
... L. G. Pryor, "Eriston," Gunnedah.
  Clarendon ...
                                     ... L. G. Pryor, "Eriston," Gunnedah.
... Whitfield Bros., "Gamble," Binnaway.
... Whitfield Bros., "Gamble," Binnaway.
... W. W. Watson, "Woodbine," Tichborne.
... W. W. Watson, "Woodbine," Tichborne.
F. Penfold, "Bluevale," Boggabri.
L. G. Pryor, "Eriston," Gunnedah.
... L. G. Pryor, "Eriston," Gunnedah.
... Whitfield Bros., "Gamble," Binnaway.
   Nabawa
                            ...
   Riverina
                            ...
   Turvey
   Waratah
   Watchman ...
   Yandilla King
Maize-
                   ... Manager, Experiment Farm, Grafton.
... Manager, Experiment Farm, Grafton.
  Leaming
Sorghum-
   Collier
                         Under Secretary, Dept. of Agriculture, Box 36A, G.P.O., Sydney.
   Feterita
                         Under Secretary, Dept. of Agriculture, Box 36a, G.P.O., Sydney.
                   ... Under Secretary, Dept. of Agriculture, Box 36A, G.P.O., Sydney,
   Saccaline
                         Mr. A. S. Pankhurst, William Street, Singleton.
  Sumac
                   ... Manager, Experiment Farm, Bathurst.
                         Under Secretary, Dept. of Agriculture, Box 36a, G.P.O., Sydney.
   White African Under Secretary, Dept. of Agriculture, Box 36a, G.P.O., Sydney.
                         Principal, Hawkesbury Agricultural College, Richmond.
Broom Millet-
```

Manager, Experiment Farm, Coonamble.

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

#### U.S.A.'s 1929 Wool CLIP LARGEST SINCE 1894.

A PRELIMINARY estimate of the 1929 clip, made by the U.S.A. Department of Agriculture, promises 301,866,000 lb., which is 2,753,000 greater than the 1928 clip, and the largest since 1894.

#### Lemon Scab and its Control.

F. C. McCLEERY, B.Sc.Agr., Assistant Biologist.

Scab, or verrucosis, is a disease which annually causes considerable losses in lemon orchards in the coastal districts of New South Wales, and the present notes are written with the idea of drawing the attention of growers to the fact that it may readily be controlled by a Bordeaux-mixture spray applied to the blossom after half, but before all, of the petals have fallen. The disease under local conditions is caused by a fungus closely related to, if not identical with, that described from South Africa as Sporotrichum citri, or in America as Sphaceloma fawcettii.



Fig. 1 .- Citrus Scab on Lemons.

It attacks the fruit and occasionally the leaves and shoots of citrus trees in the orchard. The fruit is often badly blemished and distorted (Fig. 1) and it is this effect of scab on the fruit which is the most important aspect of the disease from an economic viewpoint, in that scabby fruit either results in lowered market value or in cull fruits suitable only for the juice factory. The disease appears on the fruit in the form of irregular slightly raised scabs, greyish or pinkish in colour, or in severe cases in the form of corky projections accompanied by distinct distortion of the fruit. The surface of the diseased areas may be broken up into small fine scabs and often resembles some of the forms of scurf due to other causes. The injury does not affect the interior of the fruit, but greatly spoils its appearance for market, and is often responsible for severe shedding of young fruit.

Scab is probably the most important disease of lemons in coastal districts, and a considerable number of orchards have become neglected in the past because of lack of knowledge of control measures. The Satsuma orange (Unshiu) is also very susceptible to the disease, but the acreage under this variety is very small. Seville oranges, mandarins, and sweet oranges may be attacked in wet seasons, but scab has not as yet been reported on grapefruit in New South Wales.

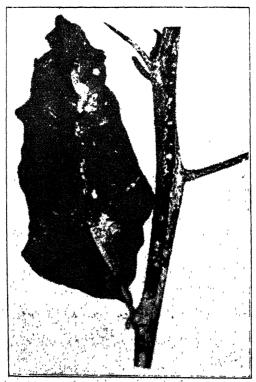


Fig. 2.- Citrus Scab on Rough Lemon Seedling.

In the nursery on rough lemon stocks, scab (or rust, as it is frequently termed) is almost always present in a severe form (Fig. 2). The earliest infections appear on very young leaves, usually on the lower side, as small more or less circular protuberances, distinctly raised on the one side and depressed on the other. As the leaf expands these spots become more conspicuous and are capped with a pinkish, brownish, or greyish scab or scurf. In severe infections the diseased areas run together into scabby masses and cause a serious distortion of the leaf. Similar scabs are produced on the young succulent shoots. The disease on the leaf and stem has a marked stunting effect on the scedling stocks for budding, frequently reducing their growth by up to 40 to 50 per cent. Many nurserymen accept its development as inevitable, but although, because of the continuous development of young growth, control is more difficult than in the orchard, the disease may be considerably reduced by frequent spraying.

The development of scab in the orchard is so closely dependent on climatic conditions that many growers are under the impression that it is produced by wet weather during the blossoming stages. Actually the fact is that the fungus causing the disease requires the presence of free moisture over a considerable period before it can bring about infection. Fruits which set in dry weather frequently escape attack.

It is only quite young, succulent tissues which are liable to infection. The young fruits are most susceptible just at and after blossoming, and rapidly become resistant, so that if the very small fruits can be protected efficiently for several weeks after blossoming there is then no danger that they will be attacked later in the season.

#### Control Measures.

Citrus scab may be readily controlled on lemons in New South Wales by spraying with Bordeaux-oil (6-4-100) in the blossoming stage after half, but before all, of the petals have fallen from the flowers. This has been repeatedly demonstrated in departmental spraying experiments in the past five years. Bordeaux mixture of 6-4-100 strength gives equally as good results as stronger mixtures of Bordeaux. The addition of oil (1 gallon to every 100 gallons of spray) gives the spray a much better spreading power, and it is more convenient to use than other spreaders. All of the brands of miscible red spraying oil on the market mix well with Bordeaux mixture, as also do the newly introduced white oils. The Bordeaux mixture should be prepared in the usual way, and then the oil, which has previously been emulsified with an equal quantity of water, carefully stirred into it.

It is recommended that the spray be applied twice in the season in orchards heavily attacked by scab; first, at the spring blossoming in September or October, and second, at the other heavy blossoming which usually takes place in January or February. In orchards where the attack of scab is only light each season it may not be profitable to spray twice. The same is found to apply after a badly diseased orchard has been sprayed for two

or three seasons—the presence of the causal fungus is so reduced that a single spray at one of the heavy blossomings will give quite satisfactory commercial control throughout the season. Where the grower concentrates more on the autumn than on the spring blossoming, or where the latter is likely to be the heaviest or most profitable crop, then it should receive the spray if only one application is to be given.

The spray should always be applied at the blossoming stage after half the flowers have shed their petals, but before all the petals have fallen. The difficulty in assessing this exact blossom stage is recognised, but experience has shown that it is essential that the spray be applied then if best results are to be obtained. Sprays which have been applied in experimental work even a week or ten days after the stage recommended have not given any control of the disease, whereas adjacent trees sprayed at the stage when three-quarters of the petals had fallen gave almost absolute control (average infection on unsprayed trees 80.4 per cent. and on sprayed trees only 4.7 per cent.).

The aim in applying the spray is to cover the very young fruits with the protective Bordeaux mixture so that, when the spores of the fungus causing the disease are carried to the surface of the fruits and germinate there, they will be destroyed before they can gain entrance to, and cause infection of, the fruits. The tendency among some growers is to consider a tree well sprayed if the foliage is well covered, but it is an easier matter to obtain a good coating of spray on the leaves than to get a good cover on the young fruits, and until this is done good results in control of scab cannot be expected. A good pressure (say, 120 lb. and upwards) makes it much easier to obtain a satisfactory covering on young fruits, particularly when the spray is applied in the blossoming stages. There is no necessity to spray the interior of the trees when spraying for scab control.

It has been recommended that all mature diseased fruit should be harvested before the main blossomings commence and that care should be taken in picking up and burning all fallen fruit and in pruning out and burning diseased twigs; but whilst sanitary measures are to be recommended as a general practice, and a certain amount of routine pruning is essential with lemons, the experience from experimental work has not indicated that any better control of scab is obtained than when spraying is carried out alone. It will be found, provided the spray is thoroughly applied at the correct blossoming stage, that almost absolute control of the disease will be obtained at once, even in bad seasons and in orchards heavily infected with scab.

#### CANADA'S 1929 WHEAT CROP FORECAST.

According to an estimate made by the Canadian Bureau of Statistics, the 1929 wheat crop for that country will only be about 293,792,000 bushels, as compared with the record crop of 566,726,000 bushels in 1928. The 1929 yield promises to be the smallest since 1924.

## Improvements in Lactic Starter Preparation for Cheddar Cheese Manufacture.

A. B. SHELTON, Senior Dairy Instructor.

In cheese manufacture the use of lactic starter has long been recognised as a necessary means of ensuring the predominance of lactic organisms in the milk in order to bring about clean ripening and lactic acid production during the process of cheddar cheese-making.

In latter years starter preparation has been simplified by the general use of lactic cultures obtainable from commercial laboratories and also, in New South Wales, from the Biological Branch of the Department of Agriculture. In spite of these convenient sources of lactic cultures, starter preparation in cheese factories has largely been a haphazard procedure in past years owing to no suitable standard equipment being available, and existing methods, even in the hands of experienced cheese-makers, gave no degree of safety against almost unavoidable introduction of contaminating organisms, which eventually crowd out the original flora introduced per medium of the culture.

In cheese factory inspection work conducted by officers of the Dairy and Biological Branches of the Department of Agriculture during 1928, it became necessary in one instance to propagate and maintain a starter free from contamination as checked by biological tests. The disabilities of the existig methods became apparent, as it was found practically impossible to obtain the desired results. Thus the necessity for designing an entirely new method or of adopting some known laboratory practice to enable pure or mixed cultures to be maintained under factory conditions in vigorous growing condition, and to allow them to be utilised to inoculate required quantities of "mother" starter and bulk starter without detrimental contamination, became an urgent problem.

After some planning and tests, simple methods and equipment to meet the purpose were evolved and arrangements were made for the necessary apparatus to be made available for purchase from supply firms under the general term of lactic culture outfits. These outfits consist of a steam heater, tubes, flasks and other incidentals for the purpose of—

- Sterilising tubes and flasks of milk in which to propagate cultures and "mother" starter.
- Inoculating culture tubes and flasks from previously prepared cultures.
- 3. Maintaining suitable temperatures at which to incubate cultures and "mother" starter.

This type of equipment has since been adopted in a number of New South Wales cheese factories in both North Coast and South Coast dairy districts, and standard methods of propagating lactic cultures and starters by the new methods are gradually becoming a uniform feature in connection with cheddar cheese manufacture throughout the State.

Appreciation of this application of a practical and scientific method for eliminating a weak link in cheese manufacture was expressed by an old cheese-maker of many years' experience when he stated that he felt rejuvenated by the added ability it gave him to produce a more uniform cheese from day to day, and later, in officially acknowledging instructions given by Departmental officers, his employer referred to the lactic culture outfit as a valuable addition to cheese factory equipment.

No difficulty has been experienced by cheese-makers in adapting themselves to the new system, although it entails the use of practices previously thought to be efficient only in the hands of trained laboratory staffs.

Apart from the advantage of being able to maintain at the factory vigorous cultures of suitable lactic bacteria as at present supplied by the Departmental Biologist for starter preparation, the way will now be open to conduct trials under factory conditions of cultures containing associate types of bacteria which have been reported by research workers in other countries as necessary to bring about better ripening of cheddar cheese. In addition, it is also found possible to follow up more closely the effect of certain strains of lactic acid bacteria on cheese flavour, body, and texture.

Along these lines a definite programme for bringing about an uplift in cheese quality is foreshadowed, as, combined with milk grading and blending and efficient pasteurisation in properly equipped factories, the more scientific control of introduced biological action is undoubtedly the remedy for many recognised defects found in cheddar choese as now made in Australia and New Zealand.

For the information of those interested in lactic starter preparation, and in the different features of the biological cultures used, a full description will be available for publication in this *Gazette* at a later date after trials under factory conditions of some cultures now under observation have been finalised.

#### INFECTIOUS DISEASES REPORTED IN NOVEMBER.

THE following outbreaks of the more important infectious diseases were reported during the month of November, 1929:—

Anthrax	***	***	***	•••		Nil.
Blackleg	***		***			в
Piroplasmosis (tick fever	)	•••	***		***	Nil.
Pleuro-pneumonia conta	giosa.	***		*** ,		13
Swine fever		•••	***	***	•••	Nil.
Contagious pneumonia		***				Nil.

Lia ... Nil.

—MAX HENRY, Chief Veterinary Surgeon.

#### REVOLUTIONARY

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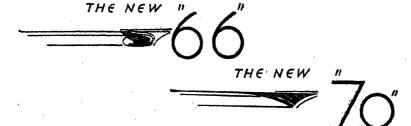
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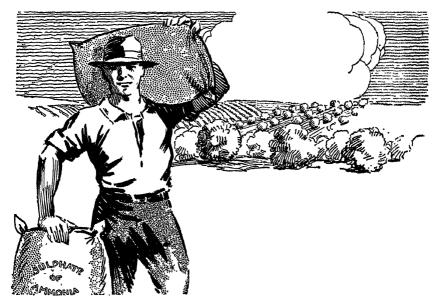


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Nowadays, most wide-awake farmers, orchardists, vignerons and market gardeners use Sulphate of Ammonia either in a complete manner or as a straight dressing and many of them use it in both forms because they have found that it pays.

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### THE AUSTRALIAN SULPHATE OF AMMONIA PROPAGANDA COMMITTEE

BOX 481 A.A., G.P.O., SYDNEY

#### Farm Forestry.

#### V.—THE NATIVE AND INTRODUCED TREES OF NEW SOUTH WALES.

[Continued from page 896.]

R. H. ANDERSON, B.Sc.Agr., Assistant Botanist, Botanic Gardens, Sydney, and Lecturer in Forestry, University of Sydney. ~

#### THE TABLELAND DIVISION—continued.

CYPRESSES (Cupressus spp.).

THE Cypresses have been widely cultivated in New South Wales and are usually fairly successful, although some species, notably Cupressus macrocarpa, have a tendency to die out at an early age. They are useful for windbreaks, shelter belts, shade and ornamental trees, and have a possible future for forest planting for timber. For windbreaks and shelter belts they are usually best planted in a single row or as an outside row to taller trees, such as Eucalypts.

The nomenclature of the group is confusing, and it is frequently difficult to refer to the one species with any degree of exactness. Each species has usually a number of forms or varieties which are more or less loosely referred to by nurserymen and others. Propagation is by seed or cuttings, although seed frequently gives rise to a number of forms quite different from the parent tree.

The following species are those most commonly grown in this State, both in the Coastal and Tableland Divisions:-

Monterey Cypress or "Macrocarpa" (Cupressus macrocarpa).

This species has been largely planted as a hedge or ornamental tree, but, owing to its habit of dying out here and there, its planting has been curtailed to some extent. It is a fast-growing species of spreading habit, and is usually fairly heavily branched from close to the ground. It forms an excellent shade, shelter and ornamental tree when well grown, but requires a deep, fairly moist soil.

The variety Lambertiana is regarded as much safer and more durable, and is recommended as the best form of this species to plant. It is a dark green Cypress with spreading branches.

ITALIAN CYPRESS OR UPRIGHT CYPRESS (Cupressus sempervirens).

There are several forms of this species, the two most commonly grown being the var. horizontalis and the var. stricta. In the former the branches are spreading and more or less horizontal, whereas in the latter they are ascending or upright. Seed from the one tree will frequently produce both varieties, but they are readily distinguished while still small plants. 'The species is planted fairly widely for ornamental purposes and windbreak formations and usually does well, being fairly frost and drought hardy. It



Italian or Upright Cypress (Cupressus sempervirens).

is a long-lived species and produces a timber of great durability and must be regarded as one of the best Cypresses for planting, both in the Coastal and Tableland Divisions.

LUSITANICA CYPRESS OR CEDAR OF GOA (Cupressus lusitanica, Syn. C. glauca).

This species is variable in form and colour, being frequently light green, but also more or less glaucous. It is usually widely branched and pyramidal in outline, making a fine shade and shelter tree. It prefers a deep, fairly moist and rich soil in cool localities, making fairly rapid growth under these conditions and does well in parts of the Coastal and Tableland Divisions, although sometimes susceptible to frost injury. It gives promise of some success if used for forest planting for its timber.

NEPAL CYPRESS OR HIMALAYAN CYPRESS (Cupressus torulosus, Syn. C. nepalensis).

This species is one of the hardiest of the Cypresses and is regarded as a valuable timber tree, producing rather fewer lateral branches than other species. It is usully a tall pyramidal tree with short horizontal branches, the graceful outline making it useful for ornamental purposes. It is sometimes grown as a hedge plant. It does fairly well in New South Wales and is often remarkably hardy, although slow-growing, and is regarded as a possibly useful timber tree for forest planting in Australia.

WEEPING OR FUNERAL CYPRESS (Cupressus funebris).

A tree with widely spreading branches and pendulous branchlets, forming a graceful ornamental tree. It has been used largely for cemetery planting and is therefore not so much in favour for ordinary purposes. It is a very slow-growing species, but does quite well in many parts of the Coastal and Tableland Divisions. It is sometimes used for hedges, but is not regarded as suitable for timber production.

Bentham's Cypress (Cupressus Benthamii).

This species does moderately well under our conditions and in some localities, such as Goulburn, is fairly fast-growing and reaches a good size. It includes several varieties, the principal ones of which are the var. Knightiana and the var. Lindleyi. The former has very regularly arranged branchlets which are more or less fern-like and drooping. The variety Lindleyi has bluish-green foliage, drooping branchlets and small fruits.

ARIZONIAN CYPRESS (Cupressus Arizonica).

This species has not been grown to any extent in this State, but is one of the most widely planted of the Cypresses in many parts of South Africa for hedges, breaks and shade trees. It does well on a wide range of soils, provided the drainage and depth are satisfactory. The lateral branches have a fairly wide spread, and provide excellent shelter, a single row of these trees being very effective as a windbreak. It also makes a fairly quickgrowing hedge, but has the fault of occasionally dying out here and there. It appears to be worthy of more extensive planting in this State, and is being given a fairly large trial in the Federal Territory.

#### Cupressus quodalupensis.

This is another of the Cypresses largely grown in South Africa, where it has proved very hardy. It is primarily a shelter and ornamental tree, having widely spreading branches and dense foliage. It might be tried out with advantage under our conditions.

Other Cypresses grown to some little extent in this State include Cupressus Goveniana and Cupressus Macnabiana. The former is a very fragrant species which has done well in the Sydney district. It is hardy and useful for shelter purposes or ornamental work. It rarely exceeds a shrub or small tree in size and is usually several-stemmed.

#### Chamaecyparis Lawsoniana.

This species is included by some botanists in the genus Cupressus, being known as Cupressus Lawsonianus. It is a very ornamental species, having horizontally spreading branches and with leaves closely appressed on the flattened branches.

#### CEDARS (Cedrus spp.).

Generally speaking, the Cedrus species do well in the cooler parts of the State. They are ornamental trees, being very graceful and symmetrical, and are hardy and will thrive on a variety of soils and sites. They furnish a valuable softwood.

The Deodar or Indian Cedar (Cedrus Deodara) is the one most commonly planted and is faster growing than the other species. It appears to prefer a summer or all-the-year-round rainfall, but is moderately drought hardy. The seed is rather perishable. Strong transplants, 1½ to 2 years of age, are generally most suitable for planting. It is a useful ornamental and shelter tree and has been suggested as worthy of a trial for timber plantations.

The Cedar of Lebanon (*Cedrus Libani*) also does well in many districts. It resembles the Deodar in appearance, but the branches are more horizontal and rigid and the foliage is not so glaucous. It is mainly planted as a specimen tree.

The Atlas Cedar (Cedrus atlantica) is grown in a few districts and resembles the Cedar of Lebanon in general characteristics.

#### PECAN NUT (Carya pecan. Hicoria pecan).

This species forms a large handsome tree and yields valuable nuts. It grows well in parts of the Tablelands Division and adjoining slopes, reaching its best development on rich alluvial soils. It is rather difficult to transplant successfully except from containers, although the practice of cutting the tap-root and searing the end with a hot iron is sometimes adopted with success. The Pecan Nut is a fine tree of the dual purpose type, providing good shade and shelter and yielding a valuable supply of nuts.

#### ELMS (Ulmus spp.).

These are essentially cold climate trees, requiring deep, fertile, fairly moist but well drained soil for their best development. In New South Wales they thrive in the cool moist portions of the Tableland Division, especially in the south, but occasionally make fair development in the Coastal Division and even in parts of the South-western Slopes. They are propagated by seeds, cuttings or layers. They are mainly deciduous or sub-deciduous species, although one or two species are practically evergreen. The principal species grown in New South Wales are the English Elm, American or White Elm, Chinese Elm, and Wych or Scotch Elm.

English Elm (*Ulmus campestris*) is a large stately tree which has been extensively planted in England and other parts of Europe, being particularly suitable as a specimen tree or for avenue work. In New South Wales it succeeds in the colder, moister parts of the Southern Tablelands on deep soil, some fine trees being grown at Tumut. It does moderately well in the Sydney district. It suckers profusely from the roots, care being necessary therefore in the choice of a site. Its main use is as a shelter or ornamental landscape tree.

American or White Elm (*Ulmus americana*) forms a tall handsome tree not unlike the English Elm, but with less tendency to sucker than that species.

Chinese Elm (*Ulmus parvifolia*, Syn. *U. chinensis*) is a smaller tree than the other Elms, but rather hardier. Its small foliage is practically evergreen, although casting a lighter shade than other species. It does moderately well in the Sydney district as well as parts of the Tablelands, but will not stand droughty conditions even in these localities.

The Wych Elm or Scotch Elm is known variously as *Ulmus glabra*, *Ulmus scabra* and *Ulmus montana*. It forms a large tree with the same general appearance as the other Elms. Some good specimens of this species were grown in the Campbelltown district.

#### JUNIPERS (Juniperus spp.).

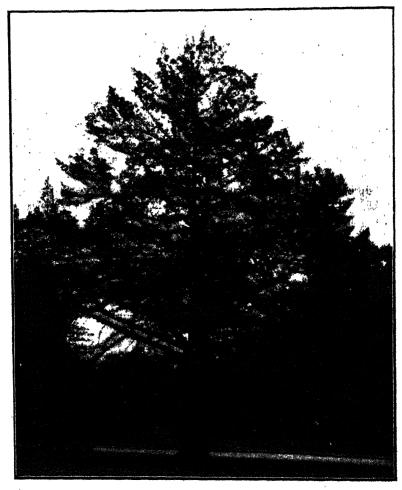
The Junipers are grown to some extent both in the Coastal and Tableland Divisions, but mainly for ornamental purposes. They may also be used for hedges, small windbreaks, or the outer rows of multiple row breaks. They are slow-growing species and not particularly successful in many parts, although worth a place in gardens as specimen trees or plants. Some, however, require a sheltered, warm position for their best development.

Bermuda Pencil Cedar (Juniperus bermudiana) often makes a fine tree, particularly in the Coastal Division, but is slow-growing and sensitive to frost. Together with the following species its timber is employed in other countries for pencil wood.

Pencil Cedar (Juniperus virginiana) is a slow-growing species, fairly frost and drought hardy, and tolerant to a fairly wide range of soils. It is

useful for hedges, small breaks, and as an ornamental tree, but although the timber is valuable, the tree is rather too slow-growing to be a commercial proposition.

Chinese Juniper (Juniperus chinensis) is a smaller tree than the other two species and is grown for ornamental purposes in both the Coastal and Tableland Divisions, having several attractive colour variations.



Bermuda Pencil Cedar (Juniperus bermudiana).

Globe-fruited Juniper (Juniperus sphaerica) does well in the Sydney district.

Abyssynian Juniper (Juniperus procera), although not grown in this State, is a species which might be tried with advantage.

#### Honey Locust (Gleditschia triacanthos).

The Honey Locust is a deciduous tree of somewhat spreading habit, armed with rather formidable spines, and possessing open, finely pinnate foliage. It grows moderately well in portions of the Tableland Division, in addition to other parts of the State.

The pod contains a certain amount of pulpy material, chiefly in the "back," which is regarded as a more or less useful fodder for cattle and pigs. There is, however, a marked diversity in the quantity of fleshy substance present in the pods of individual trees. A competition was recently held in America to procure the best selected strain of pod-yielding trees, and some seeds of these have been obtained for experimental work in this State. The productivity of the individual trees also appears to vary a good deal.

The timber of this species is durable and strong. The variety *inermis* is practically spineless, and is therefore more in favour for cultivation purposes. It is of somewhat more slender and looser habit than the typical form.

Apart from its forage value, the Honey Locust is useful for hedge work. It can be cut hard back and makes a dense, almost impenetrable hedge or small break, and it appears that its usefulness in this State will be found mainly in that purpose.

#### Miscellaneous Species.

The Big Tree of California (Sequoia gigantea) grows fairly rapidly and does well on good, deep soils in the Tablelands Division, particularly in the south. It is a useful tree for avenue planting and ornamental purposes, and to some extent for shelter.

The Californian Redwood (Sequoia sempervirens) has been planted to some extent for ornamental purposes, but does not do so well as the Big Tree. It is slow-growing and frequently sparse and unsatisfactory in its habit, but on deep soils and well sheltered sites it occasionally forms fine trees in the colder parts. The timber is valuable, but this species is not likely to be planted for this purpose in New South Wales.

Sweet Gum (*Liquidambar styraciftua*) forms a beautiful ornamental tree, the deciduous Maple-like leaves being finely coloured in the autumn. It is hardy and fairly fast-growing, but requires a deep soil for its best development. It is also cultivated in the Coastal Division, a good specimen being grown in the Sydney Botanic Gardens.

The Tulip Tree (*Liriodendron tulipifera*) is also a fine deciduous ornamental tree, growing well in the Tablelands Division, but requiring a deep soil.

Several of the Maples (Acer spp.) are cultivated successfully in parts of the Tablelands, chiefly for the beauty of their rich autumn foliage.

The Box Elder (Acer negundo) is quite hardy and makes rapid growth under suitable conditions. It is a deciduous tree with a round, fairly compact head and makes a moderately good summer shade tree.

The Strawberry Tree (Arbutus unedo) is a small compact evergreen tree or tall shrub with white flowers and red fruits, and is useful for small windbreaks or for ornamental purposes.

The European Nettle Tree (*Cellis australis*), a deciduous tree of medium size with long, flexible branches, is fairly hardy and is occasionally cultivated as an avenue or specimen tree. The sweet blackish fruit is edible. In parts of Europe the species is cultivated for its timber, which is tough and supple, being particularly suitable for handles, oars, &c. It coppies fairly freely.

The Blackberry or Sugarberry Tree (Celtis occidentalis) is a North American tree which is fairly extensively planted in that country for shade and windbreak purposes and should do fairly well in the Tablelands Division. In coastal areas it is only shrubby.

Cryptomeria japonica, one of the finest of Japanese trees, does moderately well in sheltered sites on good soil. It is most suitable for ornamental purposes, particularly as specimen trees, although its timber is largely used in its native country.

Some of the Ashes (Fraxinus spp.) do well in both Tablelands and Coastal Divisions. They are deciduous trees with wide crowns and require deep, fertile soils with fairly moist conditions for their best development. Their chief value is as ornamental and avenue trees, and although their timber is a valuable one, it can be replaced by the more easily and faster grown Eucalypts of the Ash type. The Ashes are propagated by cuttings or from seed, although the latter frequently takes a long time to germinate. The principal species grown here are:—American Ash (Fraxinus Americana), English Ash (F. excelsior), Mexican Ash (F. velutina), Desert Ash (F. oxycarpa), Chinese Ash (F. chinensis), and F. oregona.

The Maiden Hair Tree (Gingko biloba) is a beautiful deciduous, ornamental tree which does fairly well under a variety of conditions, but is rather erratic in its behaviour. It can be propagated from cuttings, but as the flesh of the fruit has a very disagreeable odour, it is advisable to propagate only the staminate form by budding or grafting.

The Chinese Privet (Ligustrum lucidum) may be used for hedges or small windbreaks. It is also adapted for planting where small trees are required in avenues or streets when it should be trained to a single stem and the crown pruned. It is a hardy species, easily raised from seed, and does well in many districts of New South Wales, both Coastal and Tablelands, and portions of the Slopes.

The Magnolia (Magnolia grandiflora) thrives in many parts of both Coastal and Tableland Divisions, forming a fine, small, ornamental tree with moderately good shading qualities. It has large, glossy green leaves and handsome flowers.

The Mulberries (Morus spp.) are valued for their edible fruits, as wind-break and shelter trees, and as a source of food for silkworms. They grow readily from cuttings, are fairly hardy and drought-resistant, and the wide spreading crowns provide excellent shade. The chief species grown are the Black Mulberry (Morus nigra), White Mulberry (Morus alba) and Red Mulberry (Morus rubra).

The Rowan Tree or Mountain Ash (*Pyrus aucuparia*) is a fine ornamental tree for the colder parts. It is deciduous, the leaves being richly coloured in the autumn. The handsome red berries add to its attractiveness.

The Horse Chestnut (Aesculus hippocastanum) does fairly well in good, deep soils, forming a beautiful ornamental tree with showy flowers and handsome foliage. It is deciduous, but provides useful summer shade.

The Chestnut (Castanea sativa) requires a deep, rich, moist, preferably alluvial soil for its best development, but its growth in this State is often unsatisfactory.

The Black Walunt (Juglans nigra) is a deciduous ornamental tree of no particular promise.

The English Walnut (Juglans regia) does moderately well in parts (see Agricultural Gazette, April, 1929, page 240).

A number of Wattles (Acacia spp.), other than those which occur naturally, make good growth in this Division, notably Acacia adunca and Acacia Baileyana.

The Tree Lucerne (see Agricultural Gazette, 1928, page 772) is useful for hedge work and for small breaks.

The Oriental Plane (*Platanus orientale*) makes good development in parts, but appears to dislike too much winter rainfall. (See *Agricultural Gazette*, 1929, page 237.)

The Douglas Spruce or Oregon Pine (*Pseudotsuga taxifolia*) is little grown in the Division, but should do well in the eastern portion of the Southern Tablelands on the slopes of the higher mountains. It requires a deep, fairly moist soil.

The various species of *Thuja* are not particularly suitable, except as specimen trees. The Book-leaf Cypress (*Thuja orientalis*) is fairly hardy and is occasionally used for tall hedges or small windbreaks.

The Osage Orange (Maclura aurantiaca) is planted mainly for hedges or small breaks round orchards, and is moderately useful. (See Agricultural Gazette, 1929, page 238, for fuller description.)

The Larch (Larix europea) is not adapted to conditions in this State, the only place where it might be expected to do at all well being on the higher slopes of the Southern Mountains.

The Judas Tree (Cercis siliquastrum) is a small, partly deciduous and fairly hardy tree. It is ornamental in appearance, the purple flowers appearing before the kidney-shaped leaves in cases where the latter are deciduous. Occasionally nice specimens are seen of this species both in this State and Victoria.

The Catalpa (Catalpa bignonioides) is a fairly hardy deciduous tree which grows moderately well both in the Coastal and Tableland Divisions, and also in the cooler, better watered parts of the Slopes. It is used for ornamental purposes.

A number of the Spruces (Abies spp.) are grown in the Division, but they are slow-growing, do not do particularly well, and should only be grown for ornamental purposes.

*Picea* spp., also known as Spruces, do not grow very well in this State. *Picea sitchensis* occasionally forms large trees, but is liable to disease and attack by red spider.

The Birches (Betula spp.) are seldom a success.

The Plum Fir (*Prunnopitys elegans*) is a handsome, evergreen, fairly hardy tree which is occasionally grown as a specimen tree in the Coastal and Tableland Divisions.

#### Additional Peppermints.

The two following species of Peppermints were omitted from the previous article dealing with the Peppermint group of Eucalypts (see *Agricultural Gazette*, October, 1929, page 746).

WATTLE-LEAVED BLACK PEPPERMINT (Eucalyptus acaciaeformis).

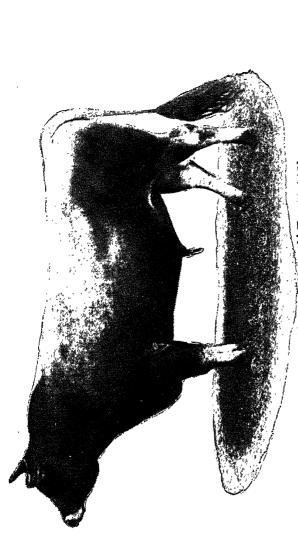
A small to medium-sized tree, sometimes reaching 60-80 feet in height, found only in the northern subdivision on the New England plateau, on rather poor, cold soils.

Uses.—This species is useful for shade and ornamental purposes in cold localities. The young growth is often dense, the foliage resembling that of a Wattle. The pale, reddish timber is of little use.

NARROW-LEAVED BLACK PEPPERMINT (Eucalyptus Nicholi).

A small to medium-sized tree of graceful, rather willow-like habit, and with very narrow leaves. It is confined to the New England portion of the northern subdivision and is essentially a species of cold, rather poor country.

Uses.—The species is distinctly ornamental and is useful for shade and shelter purposes, particularly on cold, rather poor sites. The timber is regarded as of little use.



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#### TREES RECOMMENDED FOR THE TABLELAND DIVISION.

In selecting species from these lists, reference should be made to the notes given previously on each species, and attention paid to particular requirements and features outlined therein.

#### Shade and Shelter Trees.

Camden Woollybutt (Eucalyptus Macarthuri).

Peppermint (Eucalyptus radiata)

Argyle Apple (Eucalyptus cinerea)

Black Sally (Eucalyptus stellulata)

Black or Red Peppermint (Eucalyptus nova-angelica).

Narrow-leaved Black Peppermint (Eucalyptus Nicholi).

Yellow Box (Eucalyptus melliodora).

Blackwood (Acacia melanoxylon).

Insignis Pine (Pinus radiata).

Stone Pine (Pinus pinea).

Deodar (Cedrus Deodara).

Willow (Salix babylonica), along watercourses.

Lusitanica Cypress (Cupressus lusitanica).

Pecan Nut (Carya pecan).

Oriental Plane (Platanus orientale), deciduous.

Pin Oak (Quercus palustris), deciduous.

English Elm (Ulmus campestris), deciduous.

American Elm (Ulmus americana), deciduous.

Sweet Gum (Liquidambar styraciflua), deciduous. .

Tulip Tree (Liriodendron tulipifera), deciduous.

Honey Locust (Gleditschia triacanthos), deciduous.

Cottonwood (Populus deltoides), deciduous.

#### Windbreaks and Shelter Belts.

Group I. (Shorter growing species, suitable for small breaks or for the centre lines of multiple row breaks. Some of the species given may grow moderately tall)—

Italian Cypress (Cupressus sempervirens).

Nepal Cypress (Cupressus torulosus).

Arizonian Cypress (Cupressus arizonica).

Mueller's Cypress (Callitris Muelleri).

Black Sally (Eucalyptus stellulata).

Strawberry Tree (Arbutus unedo).

Chinese Privet (Ligustrum lucidum).

Tree Lucerne (Cytisus proliferus).

A Wattle (Acacia adunca).

Silver Wattle (Acacia dealbata).

Cedar Wattle (Acacia elata).

Osage Orange (Maclura aurantiaca).

Almond (Prunus amygdalus).

Honey Locust (Gleditschia triacanthos).

Group II. (Taller growing species)—

Insignis Pine (Pinus radiata).

Yellow Pine (Pinus ponderosa).

Camden Woolly Butt (Encalyptus Macarthari).

Tasmanian Blue Gum (Eucalyptus globulus).

Peppermint (Eucalyptus radiata).

Brond-leaf Peppermint (Eucalyptus dives).

Yellow Box (Eucalyptus melliodora).

White Poplar (Populus alba var. pyramidalis).

Lombardy Poplar (Populus nigra var. italica).

Cottonwood (Populus deltoides).

Deodar (Cedrus Deodara).

Italian Cypress (Cupressus sempervirens).

Arizonian Cypress (Cupressus arizonica).

#### Hardwood Trees.

Red Stringybark (Eucalyptus macrorrhyncha), lower elevations.

Blue-topped Stringybark (Eucalyptus agglomerata).

White Stringybark (Eucalyptus eugenioides).

Mountain Ash (Eucalyptus gigantea).

Cut-tail (Eucalyptus fraxinoides).

Eurabbie (Eucalyptus bicostata).

Smooth-barked Mountain Ash (Eucalyptus altior).

Caley's Ironbark (*Eucalyptus Caleyi*). Lower elevations of New England.

Red Box (Eucalyptus polyanthemos). Fencing, lower elevations.

Snow Gum (Eucalyptus coriacea). For fencing, where better species will not grow.

Peppermint (Eucalyptus radiata). Where better species not suitable.

#### Softwood Trees.

Insignis Pine (Pinus radiata).

Yellow Pine (Pinus ponderosa).

\*Mountain Gum (Eucalyptus Dalrympleana).

\*Mountain Ash (Eucalyptus gigantea).

\*Smooth-barked Mountain Ash (Eucalyptus altior).

\* Not true softwoods, but suitable for many softwood purposes, case-making, etc.

#### Fuel.

Yellow Box (Eucalyptus melliodora). Lower elevations.

Stringybarks (Eucalyptus macrorrhyncha, E. eugenicides and other species).

Snow Gum (Eucalyptus coriacea).

Peppermint (Eucalyptus radiata).

Black Sally (Eucalyptus stellulata). On damp flats, &c.

Black She Oak (Casuarina suberosa).

Wattles (Acacia spp.).

(To be continued.)

#### Locomotory Disturbances of Pigs.

H. R. SEDDON, D.V.Sc., Director of Veterinary Research, New South Wales Department of Agriculture, and W. A. CARR-FRASER, B.V.Sc., Veterinary Research Officer, Council for Scientific and Industrial Research.

#### Introduction.

DISTURBANCES of locomotion, variously termed "paralysis," paraplegia, rheumatism, &c., affecting the pig have been brought before field veterinary officers of the New South Wales Department of Agriculture from time to time during the past few years, and, as porcine affections of this type have been far from uncommon, yet knowledge is comparatively meagre, the matter has been the subject of investigation.

The material forwarded for study during the years 1923-25, together with field reports of officers and notably of Mr. A. L. Rose (who published part of his observations') soon revealed the fact that there were probably several disease conditions which to the pig breeder had presented such similarity that they had been referred to for lack of better knowledge by the term "paralysis." Our first work, therefore, was to endeavour to recognise the various diseases that had been so grouped together. In this some measure of success has been attained, and it seems rather appropriate to review our present knowledge of those diseases or ailments of pigs which can properly be included under the term "locomotory disturbances." It is recognised, of course, that some of the disease conditions to which we shall refer are not primarily or essentially diseases of the locomotory system. Among the manifestations of these diseases, however, there are prominent symptoms referable to the locomotory system of the pig, and therefore any attempt at a review of disturbances to that system would be incomplete unless mention were made of them.

One of us (W.A.C.F.) has been investigating one of the major of the complaints for the Council for Scientific and Industrial Research, and during that time has been able to make observations on most of the conditions about to be mentioned. The other writer was concerned with the earlier investigations into those bacterial conditions (arthritis and otitis) which one was able to split off from a group-complex which had hitherto been referred to by the general term of "paralysis," and has for some years recognised that the use of this term has been particularly unfortunate.

#### General Review of Locomotory Disturbances.

It is commonly possible to supply a simple classification of any series of conditions that one is about to describe, but the subjects of this paper do not readily lend themselves, for, as will be seen, there is, a marked overlapping due to the fact that trauma plays a part in the development

of several conditions, widely separated as regards their causation. One may, however, group the conditions broadly as follows:-

Group I .- - Purely traumatic affections.

Group IL-Bacterial affections.

Group III.—Affections in which trauma is the exciting cause, but where a certain predisposing state or condition is essential.

Group IV.—Affections of obscure origin.

The overlapping referred to is between Groups I and III, and the determination of whether cases belong to Groups I or III may present much difficulty, inasmuch as one cannot always, with certainty, state whether the underlying predisposition postulated for Group III is present or not.



Fig. 1 .- A Case of "Pig Paralysis," so-called.

#### Purely Traumatic Affections.

In any species of animal actual trauma is the commonest cause of a disturbance of the locomotory system. Fractures are the most serious as a rule, and bruises and strains generally lead to less harmful effects. One will here presume that one is dealing with pigs of normal (in this case, proper) skeletal development, for, as will be seen later, we find that in certain animals the skeletal development is such that fracture is quite common. In the normal pig, therefore, fracture of bones, rupture of ligaments, strains of tendons or muscles, and bruising of the softer tissues of the limbs do not seem more prone to occur than in animals of other species, and when they do are of such a nature as one would expect from the degree of trauma involved. The symptoms are, likewise, no different from what one would expect from such an injury in any normal animal.

But trauma may exert itself on tissues other than those mentioned above, and another locomotory disturbance, not infrequently met with subsequent to parturition in sows, seems to be due to injury to certain nervous struc-Parturition is quite successful, the young are born alive, the sow has cleansed but it is found that she is unable to regain her feet, lying inertly on her side. There may or may not be any evidence of pain, and it may be found that either one or both of the hindquarters is paralysed, the animal being incapable of initiating any movement of the affected part, yet manipulation will show that movement may be executed, there being no impediment to movement in either the osseous or articular systems. Rectal examination may evince pain on the lateral superior aspects of the pelvic cavity. Careful nursing in such cases is generally all that is required to restore the animal to normality in the course of several days. The condition is a sequela to injury to the nerve trunks supplying the hindquarters during the violent and prolonged muscular efforts required to expel the foeti. In rarer cases of this condition it may be found that the injury to the nerve trunks is permanent and recovery does not take place.

#### Bacterial Affections.

These may be divided into two groups—(a) general systemic affections, and (b) local affections.

- (a) General Systemic Affections.—Possibly the best example of this is the locomotory disturbance seen in swine fever. It is manifested comparatively early in the course of the disease. So prominent a symptom may it be that cases of swine fever have been actually reported as cases of the so-called "paralysis" for the reason that there is a very marked inco-ordination of the movements of the hindquarters, the animal swaying from side to side and often plaiting the hind feet. Experience goes to show that it may occur in other systemic affections, but it does not appear to be so marked as in cases of swine fever.
- (b) Local Affections.—These may be again divided, depending upon the site of the lesions, i.e., as to whether they occur in the head and vertebral column or in the limb bones. Lesions which have been found to be associated with locomotory disturbances have been encountered in (i) internal ear, (ii) brain and/or meninges, (iii) spinal cord and/or meninges, (iv) spinal column, (v) joints and limb bones; and the bacteria involved have been (1) Bacillus tuberculosis, (2) Bacillus pyogenes, (3) bacillus of nonpyogenic arthritis (undescribed), (4) mixed infections.

As specific terms may be given to several of these disease conditions and they are of relatively common occurrence they will be dealt with as such, the more important conditions being discussed first.

Suppurative Otitis. A short note on the condition was published by Seddon and Carne<sup>2</sup> in 1924. The most prominent symptoms are a peculiar alteration in the carriage of the head, more or less unsteadiness of gait, and the exhibition of circling movements. These symptoms are due to a suppurative affection of the bulla ossea, and the symptoms vary with the extent of the disease and whether it is uni- or bi-lateral. Bacteriological investigations showed that in many cases the infection was a mixed one, but in other cases, particularly those where the tympanum had not been ruptured, B. pyogenes was present alone. It is believed that infection is via the eustachian tube from a pre-existing catarrh of the naso-pharynx, and further, that the initial infection is by B. pyogenes.

This disease is not an uncommon one, particularly where pigs are kept under bad sanitary surroundings. It was the first of the bacterial affections to be split off from the group term "paralysis," and, though the symptoms are quite distinct from those we recognise as the essential symptom-complex of the so-called pig paralysis per se, there is no doubt that pig breeders have frequently confused the conditions in the past.

Pyobacillary Arthritis.—This disease has been recognised in certain other countries of the world, notably in Europe. Up to the time of the investigations of one of us (H.R.S.) and Carne (unpublished), B. pyogenes does not seem to have been recognised as the cause of disease in pigs in Australia, nor the fact that it is commonly the cause not only of suppurative arthritis but of suppurative otitis.

Our attention was first called to pigs in which there were swellings in the vicinity of joints (usually hock and elbow), frequently with suppurating sinuses leading from these swellings. Further examination showed that these abscesses in the vicinity of the joints were in association with similar suppurative foci in the ends of the larger limb bones. These abscesses in the bone communicated at times with the joint capsule (giving rise to a suppurative arthritis), at other times with abscesses in the subcutaneous tissue in the vicinity of the joint (suppurative periarthritis).

On boiling the bones involved, foci of absorption were present in the epiphyses, together with more or less extensive peri-articular osteophytic outgrowth. Bacterial examination showed the unopened suppurative foci to be associated with B. pyogenes, and intravenous inoculation of this organism into pigs was followed by its localisation in the ends of the larger limb bones and the development of lesions such as are seen in natural cases.

The symptoms exhibited by animals suffering from this affection are quite severe in nature. Initially there is marked pain and the animal will move only with the greatest reluctance. Later, the condition may become less acute, but progression is always painful. Swellings appear about the joints and usually rupture externally. In protracted cases the osteo-arthritis leads to anchylosis of the joint.

The disease is not uncommon, especially in pigs kept under unhygienic conditions, as they so often are, and is to be recognised and differentiated from other forms of arthritis by the presence of abscesses and suppurative sinuses in the vicinity of the joints.

Non-suppurative Arthritis.—As the name implies, this is to be differentiated from the lastnamed by the fact that there is no suppuration. The cause is a bacillus which resembles B. pyogenes very closely, but, differing markedly in certain characters, is to be regarded as distinct. It does not appear to have been described elsewhere, and curiously enough first came to our notice as a cause of arthritis in lambs. The bacillus was first isolated by Carne, a further account of the disease being published by Seddon and Carne later. It has been met with only rarely in pigs, but arthritis in sheep due to this bacillus occurs not infrequently. Possibly the systematic examination of more porcine material would show that it is not uncommon in that animal also.

This type of arthritis as we have observed it in pigs has been characterised by (a) marked lameness, (b) little deformity, (c) no suppuration.

Like B. pyogenes, this bacillus, as we have found by intravenous inoculation, exhibits a predilection for the epiphyses of the limb bones. There it exists in small haemorrhagic foci just underneath the cartilage. There is no visible erosion of the cartilage, but that the organism escapes into the synovial fluid may be shown by culture. This synovial fluid is at first slightly cloudy and increased in quantity, but later the joint becomes almost dry. Roughening of the cartilage may then occur. The synovial membrane where it lines the joint capsule becomes thickened, and as periarticular osteophytes make their appearance the joint may become anchylosed. There is slight fibrous and bony thickening around the joint, but in the fresh specimen the lesions are comparatively insignificant, and far less impressive than what is seen after the bones have been macerated or boiled.

Tubercular Arthritis.—Lesions of tuberculosis of the joints as observed by one of us (H.R.S.) have consisted of marked peri-articular enlargement, due (apparently) to tuberculosis of the synovial membrane and extension therefrom. The lesions were firm, fleshy, and presented much the same appearance as the tubercular granulation tissue seen so commonly on the pleurae or other serous membranes. The degree of locomotory disturbance depends, of course, upon the extent of the lesion.

Tuberculous Osteitis of the Spinal Column.—This condition is well known and requires no description. We have not observed any specific locomotory disturbances arising from it, but from lesions we have seen would imagine that in certain cases where the lesions have become extensive they would interfere with intervertebral movement and lead to at least a stiffness of the vertebral column, perhaps also to kyphosis. The condition is included here only to make the article more comprehensive.

Cerebral Abscess.—One case of so-called "paralysis," which unfortunately we did not see alive, but which was said to have shown complete paralysis,

was found on post-mortem examination to have a cerebral abscess due to *B. pyogenes*. The abscess was a superficial one, and involved the meninges of the brain.

Spinal Maningitis.—A case of paraphegia to come under notice showed a local maningitis of the cord associated with the presence of B, pyogenes.

#### Affections in which Trauma is the Exciting Cause.

Under the heading of affections in which trauma is the exciting cause, but where a certain predisposing state or condition is essential, one may consider certain conditions whose cause may not be specifically determined, but in which, nevertheless, there exists a high degree of probability that a similar cause-complex is operating. The conditions which one may encounter are:—

- (a) Ostalgia of the non-pregnant pig.
- (b) Ostalgia of the breeding sow.
- (c) Spontaneous fracture of bones.



Fig. 2.—Pig Affected with Non-pyogenic Polyarthritis. Natural case.

In the course of certain investigations one of us (W.A.C.F.) has made observations upon the gait of pigs maintained on certain diets, and the following is based primarily upon that work. The writer is of the opinion that these three locomotory disturbances are brought about in a similar, but not necessarily identical, manner, and that they are intimately related to the mineral metabolism of the pig.

- It is generally believed that the skeleton of an animal may react to-
  - (1) An absolute deficiency of (a) calcium, or (b) phosphorus, or (c) both calcium and phosphorus.

(2) A relative deficiency in one or both of these elements brought about by certain factors which prevent the assimilation of adequate quantities of these elements.

Thus a hypocalcic or hypophosphoric condition of the osseous skeleton may be found in animals, and clinically the manifestation may be found in the locomotory system.

In the bone strain of the non-pregnant pig, there must be either an absolute deficiency of mineral elements in the dietary or a lessened assimilation of these elements. The physiological mineral metabolism is not optimum.

In the ostalgia of the pregnant and suckling sow the physiological mineral metabolism is vastly increased. The pregnant sow is building up the bodies of her unborn litter, whilst the suckling sow is secreting in her milk huge quantities of mineral salts for the young she is suckling. The whole of this mineral output has to be supplied from the food, or, should the source of the minerals from the food be inadequate, the sow is called upon to deplete her bodily reserve of these substances. The bodily reserve being the osseous skeleton, a diminution in the calcium and phosphorus content ensues.

The clinical features of these three conditions are now treated individually, but it is felt that they must be considered collectively as the manifestations of varying degrees of skeletal mineral deficiency.

(a) Ostalgia in Non-pregnant Pigs ("Bone Strain" or "Bone Soreness") -During certain experiments, in which pigs were fed diets that were most probably deficient in certain mineral elements, notably in calcium and phosphorus, or in which the assimilation of these elements was inadequate, it was found that pigs first evince certain depravities, such as urine drinking and coprophagy, and later may suffer certain locomotory abnormalities if they forcibly resist any restraint. The animals may carry one or more limbs, or may limp very noticeably on one or more limbs. They are unwilling to move, and show evidence of acute pain. These symptoms persist for several days, and eventually pass away. It has been found on postmortem examination of such animals that the diaphyses of the long bones are very thin, and somewhat softer than normal, while within the epiphyses there is often a small cavity of irregular contour containing a soft fatty substance resembling bone marrow. Furthermore, the ribs often show marked "bossing" at the costochondroses, and not infrequently healed or healing fractures of the shafts. Should an animal be killed while showing acute lameness of a limb, no evidence of fracture of any of the bones of that limb can be seen. It is believed that pigs, fed upon these diets deficient in calcium or phosphorus or both, develop skeletons having either a diminished calcium or a diminished phosphorus content, and that when such an abnormal skeletal state is reached the application of a force of unusual magnitude, or a sudden action, may produce certain strains in the bones without an evident rupture, but resulting in a painful lameness. If animals which have been showing this lameness receive a mineral mixture as a supplement to the previous ration, it is found, after a short while, that lameness does not eventuate should these animals struggle against restraint.

The above condition, artificially produced by the deficiencies of the particular diets, is more pronounced than that which would be brought about by the feeding of the usual diets to pigs; but there is evidence that there is a relative inadequacy of calcium and phosphorus in the diets usually fed to pigs, *i.e.*, when milk does not form a major portion of the ration. Therefore, it is quite probable that in young pigs which are improperly fed one may encounter the sudden onset of a painful lameness arising out of a trauma that would not affect an animal possessed of a normal skeleton.



Fig. 3.—Proximal Articular Surface of First Phalangeal Bone of Pig in Figure 2. Shows Erosion of Surface and Periarticular Osteophytic Growth.

(b) Ostalgia in Breeding Sows ("Bone Soreness").—A condition which is by no means uncommon is seen to affect sows that have been used for breeding purposes. The symptoms are those of an acute lameness of one or more limbs, and sometimes a very definite disinclination on the part of the affected animal to permit the vertebral articulations to undertake their normal degree of movement. In many respects the condition resembles that seen following the resistance of restraint by animals fed upon deficient diet, except that in these cases in breeding sows there is the history of repeated successful parturition and the lack of knowledge of definite trauma. The administration of mineral mixtures rich in calcium and phosphorus to affected animals soon brings about a recovery, and if sows that are heavily bred are fed a mineral mixture as a routine, the condition does not occur.

Our interpretation of the condition is that during the frequent pregnancies and suckling periods the mineral reserves of the body of the sow are depleted, and that the diet, though it may contain adequate mineral matter for the non-pregnant and non-lactating animal, does not contain sufficient mineral matter to meet the increased demands of the physiological processes, thus rendering the skeleton either hypocalcic or hypophosphoric or both. Thus, the effect of parturition leads to a trauma which, whilst it would not affect the normal animal, in these animals produces strains in the bones giving rise to an ostalgia.

(c) Spontaneous Fracture.—The exclusive feeding of maize or the feeding of rations composed for the major part of maize, has been shown by

Bohsted<sup>5</sup> and others in America to predispose to spontaneous fracture of the shafts of ribs, of the long bones of the limbs, and of the bodies of the lumbar vertebrae. From similar experiments one of us (W.A.C.F.) has been able to corroborate these findings, especially the fracture of the shaft of ribs and of the proximal bones of both the fore and hind limbs. Only in one case did one find a fracture of the lumbar vertebrae in a pig fed upon an exclusive diet of maize. In this case the exciting trauma was very great, in that the animal floundered through a quagmire about a foot deep, whereas Bohstedt found that the trauma need not be excessive to give rise to a spontaneous fracture of the lumbar vertebrae.

It is possible that this condition may occur naturally in pigs fed upon diets of low mineral content, i.e., those from which milk is absent, or when no mineral supplement is fed.

Thus, with a certain degree of skeletal mineral deficiency, one may find ostalgia minifested, whilst with a greater deficiency fractures may occur. Both ostalgia and spontaneous fractures have been seen in pigs on these deficient diets. And, as what we believe to be ostalgia has been seen in breeding stock, so we may mention the occurrence of a case of spontaneous fracture in an animal of the same type. Unfortunately we have no information as to the dietary of this animal. She had borne two litters, and was found to be incapable of movement of the hindquarters. On slaughter a depressed fracture of one of the lumbar vertebrae, causing pressure on the spinal cord, was found. This case comes from America, and we are indebted to Dr. Jervis for the information. No similar case has been met with here, but from the fact that similar symptoms have been observed not uncommonly in breeding sows here, it would seem likely that a post-mortem examination might reveal similar lesions in a percentage of them, particularly those which show no signs of recovery from the paraplegic state.

#### Rickets.

For some reason or other there is an idea, very prevalent amongst those interested in the pig, that the young pig is very susceptible to the onset of "rickets" (rachitis). That such an idea is supported by the work of Orr" and some American investigators is well known, yet my own experience (W.A.C.F.) does not accord with this. Many young pigs affected with locomotory disturbances have been observed, and quite a number of experimental pigs that have been slaughtered have shown marked lesions in the osseous system, but in neither ante- nor post-mortem has a case in which the findings would lead one to the diagnosis of rachitis been encountered. Bossing of the ribs, softening of the bones, and spontaneous fracture of certain long bones may be seen, but there is no evidence of distortion of the long bones of such animals, no marked irregularity in the contour of the epiphyseal plate, and no formation of a metaphysis. From the clinical and naked-eye post-mortem pictures these cases appear to be osteoporosis or osteomalacia and not rachitis. Though the point is to be investigated further, one may point out that skiagraphs of animals so affected do not

show the typical radiographic evidence of rachitis. Until such time as it has been demonstrated conclusively that rachitis is to be seen in young pigs in this country, it is felt that the empirical diagnosis of such a complex pathological condition is to be deprecated.

#### Affections of Obscure Origin.

We now come to a group of disturbances affecting the locomotory system of which the etiology is not definitely known, the components of the group being: (a) Parturient paraplegia of sows, (b) pig paralysis.

(a) Parturient Paraplegia of Sows.—This condition is by no means infrequent in sows, and it seems to have a higher incidence in piggeries in which little or no special care is given to the gestating sow prior to parturi-

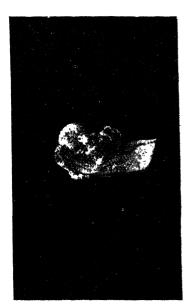




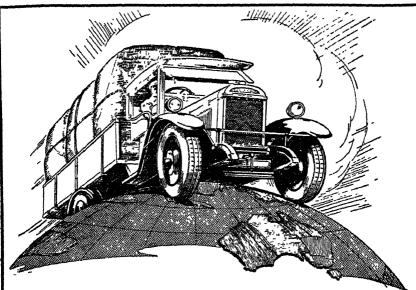
Fig. 4.— Distal Exemity of Humerus (left), and Proximal Extremity of Radius and Ulna (right) from Case of Pyobaelliary Arthritis, showing Osteophytic Peri-arthritis and Erosion of Articular Surface. Natural case.

tion. The affected sow is quite normal up to within a few days prior to or after parturition; then quite suddenly the animal is found lying on its side and is incapable of moving the legs to regain the quadrupedal position. The temperature may be slightly elevated, the respirations somewhat accelerated and, though no definite objective evidence of pain may be seen, the animal is hyperexcitable. Constipation and retention of urine are fairly constant features of the condition.

Naturally the pre-parturient paraplegia is the more important, in that the sow may not be able to expel her litter, and also in that owing to the adoption of medical measures upon the expectant dam there is the imminent

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risk of loss of the litter. The usual treatment adopted consists in good nursing, feeding upon nourishing but laxative soft foods, the administration of frequent doses of laxative designed to produce efficient evacuations without purgation and also the offering of assistance in the voiding of urine. In the pre-parturient type of the condition the evacuation of the mammary glands and subsequent fomentation thereof may be helpful.

The prognosis must be guarded, in that some cases respond well to treatment whereas others fail to respond and are soon dead of the condition per se or of secondary disorders, e.g., hypostatic pneumonia.

In differential diagnosis it is necessary to exclude fracture of the pelvis, fracture of the vertebrae, and the post-parturient paraplegia due to injury to the large nerve trunks of the hindquarters.

- (b) Pig Paralysis.—Adopting all of the five following criteria for differential diagnosis—
  - (1) An absence of a history of traumatism.
  - (2) An absence of a history of parturition.
  - (3) That the age of the affected animals should be between three and twelve months.
  - (4) That a clinical examination should reveal no abnormalities in any systems of the body.
  - (5) That the findings of the clinical examination should be confirmed and supported by a post-mortem examination in which no macroscopic lesions are found.

it has been found by one of us (W.A.C.F.) that all of the locomotory disturbances previously mentioned are eliminated, yet there is a very definite residual. This residual presents a syndrome which may be taken as specific of some disease.

#### Symptomatology.

The affected pig is often in prime, but always at least in good condition, and its age may vary from three to six months. Initially it will show slight side to side swaying of the hindquarters and some slight incoordination of the movements of the hind legs during progression. When standing at rest, the animal may "mark time," raising and replacing each hind foot alternately. The tendency to "mark time" becomes more accentuated, and soon it may be noted that when a hind foot is placed upon the ground, flexion of the distal phalangeal articulations takes place, the animal thus "knuckling over." The affected animal may be seen to stand either with its hindquarters resting against a corner of its pen or against the walls of the pen. In addition the hind feet are markedly adducted, and when in contact with the ground they may be touching each other or placed on the opposite side of the median longitudinal body plane ("plaiting"). The lateral swaying of the hindquarters and inco-ordination of the movements of the hind legs becomes more prominent. As the hind foot is

advanced, there may be marked flexion of the femore-tibio-patella articulations (stifle) together with excessive flexion of the tibio-tarsal articulation (hock), the foot being carried forward in adduction, giving rise to a peculiar gait simulating "stringhalt" in horses. A variation that may be seen at this point is when there is a diminished amount of flexion of the proximal articulations and the hind foot scarcely clears the ground and is still adducted. "Knuckling over" of the hind foot bearing the weight of the body is now an almost constant feature. Because of the latter there is a momentary loss of equilibrium, which the animal endeavours to rectify by hurriedly completing the next stride. This may or may not be normal, and if not normal the balance is very soon lost, the hindquarters sway far from the median body plane until the lateral surface of one ham is in contact with the ground. The animal may be able to recover approximately the quadrupedal position or it may progress by dragging itself along by traction with its forelegs, the lateral aspect of one hindquarter being in contact with the ground and the hind feet being placed obliquely transverse to the longitudinal axis of the body. An animal which would show these symptoms on progression is frequently seen sitting on its haunches like a dog. There is no evidence of pain, but the affected animal may be more excitable than a normal one.

The next stage is reached when all efforts initiated by the animal are unsuccessful in raising the hindquarters from the ground and the only mode of progression is by traction with the forelegs. An animal affected to this extent may show decubitus sores upon the lateral aspects of the tarsal articulations of the metatarsi and of the proximal phalangeal articulations and the lateral and posterior surface of the ham may be devoid of bristles.

Spasmodic twitching of the lateral groups of muscles of the femoral region may be noticed at times, and while at rest the hind feet may even be seen to beat an irregular tattoo upon the ground.

Generally the condition does not become more intensified than this, but it may be that the forelegs are involved. In such cases the animal, sitting on its haunches, is unable to support the weight of the body upon the forelegs, the carpi becoming flexed and the animal is crouching upon its haunches, taking the weight of the forequarters upon the carpi and the cranial aspect of the metacarpi and phalanges. It is very difficult for an animal affected to this extent to progress at all, for it is unable to employ sufficient traction with its forelegs to overcome the inertia of the affected hindquarters. Up to this stage the affected animal eats well and puts on, or at least maintains, condition, but by reason of its physical inability and inanition a falling off of condition soon takes place.

There is no hyperpyrexia, no disturbance in the functions of the alimentary and urinary systems, no clinical abnormality of the muscles, bones, or joints of the limbs. Sensory and motor reflexes of the extremities are present and manipulation reveals the potentiality of the performance of all normal movements of the units of the appendicular locomotor system. A

slight degree of hyperexcitability is usually seen. Not constantly, but by no means rarely, two very interesting clinical phenomena are evident. If the affected animal is restrained, it is noticed that, instead of being able to emit the characteristic and modulated porcine squeal, its vocal capabilities are restricted to a high pitched falsetto monotone. This change of voice, when once present, persists.

Should such an affected animal be forced to move quickly it may be found that, after several inco-ordinated strides it falls upon its side, struggles somewhat violently, and the respirations become more laboured and rapid, the tongue protrudes from the patent jaws and the visible mucous membranes become cyanotic, a typical picture of air hunger. Even if unmolested, it may be some time before the animal is able to move, and in one instance it was observed by one of us (W.A.C.F.) that further restraint produced such a marked degree of respiratory embarrassment that death resulted.

### Macroscopic Post-mortem Findings.

An animal typically affected with this condition presents a post-mortem picture that is devoid of any constant macroscopic pathognomonic lesion.

### Incidence of the Condition.

Certain factors, of which the three most important seem to be (1) increased knowledge concerning locomotory disturbances, (2) the formulation of the postulates for the differential diagnosis of this condition, and (3) the hesitance of stockowners to report cases, prevent one from dogmatising upon the incidence of this specific locomotory condition. During 1927-28 one of us (W.A.C.F.) encountered it in various districts in New South Wales; in December, 1928, numerous cases were seen in Queensland, and in February, 1929, several cases in two widely separated districts were seen in Victoria. In South Australia, in February, 1929, no typical case of this condition was seen. In 1925-26 in New South Wales it had been the experience of the senior author and of the field veterinary officers of the Department of Agriculture that the condition was decidedly common during that period. It does occur, but it would seem to have been less prevalent during 1927-28 than formerly. This may be accounted for on three assumptions:—

- (1) The specific condition herein treated is not of such frequent incidence as hitherto believed (other conditions having been confused with it),
- (2) the possibility that the husbandry of pigs has improved, and that with such change there is a falling off in the incidence of the specific locomotory condition,
- (3) that the incidence has declined quite apart from any effect of husbandry. (It is known that the incidence of the condition on any particular farm varies from time to time.)

Possibly all three factors have exerted their influence.

In making a field investigation one obtains usually a most unenlightening history. For several seasons, under apparently identical dietetic, hygienic, and even genetic conditions, litters of pigs have been successfully produced. Suddenly, in one, several, or many of the young pigs this peculiar locomotory disturbance appears soon after weaning and usually during the third or fourth month of life. On neighbouring farms there may be no cases of the condition, and it may be that for one or more seasons no cases are reported in localities in which the condition has been known to occur previously. The affected pigs may be litter mates or they may be members of different litters, but of similar age. One has seen ten cases out of twenty-five pigs comprising three litters, but it is more usual to obtain only one, or two or three cases among all the young pigs upon a farm. No definite seasonal incidence has been established.

One has been unable to correlate the incidence of this specific syndrome with any given dietary. It has been seen where maize, maize and skim milk, with or without grazing, have constituted the nutritional regimen, and also where slaughterhouse offal with no cereal or milk products has been the sole dietary.

The condition has been seen in some very insanitary piggeries, yet in neighbouring insanitary piggeries it has not been found. Though insanitation of the piggery is a more or less constant feature, the incidence of the condition is relatively low.

### Economic Importance of the Condition.

As it is exceptional to find an animal affected to such an extent that it cannot feed, the farmer usually may obtain some return from animals affected with this condition. Affected animals will become prime in condition in the same time as normal animals with which they are penned provided adequate food is available, and hence there need be no economic loss from this point of view. Difficulty arises from inability to get the animals to place of slaughter, and should it become imperative that affected animals be trucked to market, the likelihood of them being suffocated is greater. Another feature worthy of note is that in the typical piggery, dirty, damp and dark as it usually is, the affected animal is predisposed to secondary disorders, especially pneumonia.

### Ætiology of the Condition.

(a) Bacteriological.—In all cases in which the clinical and macroscopic post-mortem picture agreed with our postulated conception of this condition, both aerobic and anaerobic culture media sown from the synovia, cerebro-spinal fluid, blood, the bones and bone marrow, the splanchnic and nervous systems, remained sterile or showed only the growth of organisms which, on further examination, were found not to be associated with the etiology of this condition.

- (b) Inoculation Experiments.—Various unsuccessful endeavours were made to set up the condition by the inoculation into pigs of susceptible age of sterile emulsions or extracts prepared from the following systems of a naturally occurring case:—
  - (1) splanchnie;
  - (2) vascular (clotted heart blood);
  - (3) nervous;
  - (4) haematopoeic.
- (c) Contact Experiments.—Several experiments were undertaken in which pigs of susceptible age were housed in immediate contact with an affected animal either in concrete pens or in pens with earthen floors. These experiments similarly failed to reproduce any locomotory disturbances in the "in contact" animal.
- (d) Environment and Dietetic Experiments.—Seeing some possibility of an analogy between the naturally occurring condition in Australia and the reports of a condition set up in pigs fed upon deficient diets by American investigators, notably Kernkamp, Maynard, and Bohstedt, and by Orr in Scotland, it was decided to undertake similar experiments. These experiments constitute the subject of another paper, but it may be stated that—
  - (1) The feeding of pigs upon an exclusive ration of maize, either white or yellow, in either concrete pens or in "open lot," failed to produce a locomotory disturbance in any way simulating the naturally occurring condition.
  - (2) The feeding of one pig upon an exclusive ration of milled rice did not produce a similar locomotory disturbance.
  - (3) In certain of these experimental animals transient mild locomotory disturbances were induced, and in three animals a certain very marked locomotory syndrome was brought about. Regarding the latter phenomenon, it can be definitely stated that it bore no similarity to the naturally occurring condition we are describing, but at present one is not prepared to admit that it was identical with the findings of the American investigators.

### Inferences Based upon Observations Concerning Ætiology.

The above investigations lead one to believe that the naturally occurring condition is—

- (1) not a primary specific bacterial affection,
- (2) non-transmissible to susceptible animals by either (a) contact with, or (b) the inoculation of material from, naturally occurring cases,
- (3) not produced as the result of restriction of pigs to an exclusive diet of either maize or rice.

### Observations upon Naturally Occurring Cases.

Naturally occurring cases were obtained, kept under certain environmental and dietetic conditions, and a clinical record of their response to the condition was kept. It was found that when such animals were housed in concrete pens which were cleaned daily some few recovered to become clinically normal, others showed marked improvement, others showed no improvement and a few became progressively worse. Even in these cases there appeared to be no correlation between improvement and diet. In addition, it may be stated that one became tempted to consider environment as being a factor exerting an effect upon the response of the affected animal, and for this reason some animals which had previously been confined in hygienic concrete pens upon a diet of maize, pollard and mineral mixture, and had shown some degree of improvement, were transferred into pens with earthen floors which were not cleaned. No further improvement took place, and it is a moot point as to whether there was not an exacerbation of the condition.

Skiagraphs of the limbs of naturally occurring cases of this condition have been taken, but no evidence of the typical skiagraphic manifestations of rachitis appears to be present (W.A.C.F.).

Finally the greatest difficulty in connection with this syndrome, postulated as specific, is to find a single term which will accurately describe the syndrome. The inability to do this is admitted, but very sound grounds. for the absolute condemnation of the word "paralysis" are presented by the clinical findings. Even in the most marked cases there is no paralysis. At all times there is the potentiality of the normal functioning of all units. of the locomotory system. Manipulation of the hind- or fore-limbs shows. that any normal movement may be undertaken by each and all of the members of these units, and observation of the very bad cases in which the animal is so incapacitated that it remains stationary, though not immotile. shows that it can still voluntarily execute the normal movements of its. limbs. The syndrome is one in which there is an inability upon the part of the affected animal to co-ordinate voluntarily the normal movements of the hind-limbs and lumbar vertebrae, and in rarer cases of the more cranial articulations of the body. The cause of this inability is at present undetermined.

### In Conclusion.

Concerping the residual remaining after the application of certain differential diagnostic postulates, the observation of the syndrome, the age incidence of the naturally occurring condition among pigs, and the response of the affected animals to certain environmental and dietetic conditions have been recorded. Sufficient clinical evidence to lead one to believe that it is not of a paralytic, dietetic, bacterial or ordinarily transmissible condition appears to have been accumulated. Also it is believed that it is not of a rachitic nature.

Seeing that all work designed to determine the causation of the condition has given negative results, it may be stated that one is unable to offer any very useful advice regarding the prevention or treatment of the condition except that there appears to be some reason to associate improvement among affected animals with hygienic surroundings. No knowledge has been obtained regarding the optimun condition-complex necessary for the incidence of the complaint, though it would appear that, as the incidence of the complaint varies from time to time and from place to place, such a specific condition-complex exists. It seems rather optimistic to expect to determine this until such time as some positive knowledge concerning the ætiology has been accumulated.

### Review of Locomotory Conditions in General.

From the foregoing it will be seen that, as indicated at the outset, there are quite a number of conditions in pigs in which locomotory disturbance is a marked feature. Any measures for the prevention or control of these must be founded upon exact information as to their etiology. The detection of the etiology of transmissible diseases is comparatively easy, but of non-transmissible affections notoriously difficult. Though there yet remains much to do to complete our knowledge of the non-transmissible affections, it is felt that as a result of the investigations of the one (W.A.C.F.) of us who had devoted special attention to them, our knowledge has been considerably enhanced and we are now able to recognise that the cases previously grouped rather vaguely as "paralysis" fall into one of several categories.

All this information has a considerable bearing from the point of view of the prevention or control of these diseases. The manner of dealing with the bacterial conditions is fairly obvious, and there is no doubt that, as a result of the work done, measures calculated to prevent the non-transmissible affections will be put into operation. The result of this, and of other observations suggested by what has been written regarding these affections, will doubtless do much to substantiate or otherwise the views put forward. And thus the outcome will be, we hope, the more complete understanding of these diseases (H.R.S.).

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Department of Education, Brush Farm, Eastwood	***		8		930
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Kinross Bros., Minnamurra, Inverell (Guernseys)			73	14 ,, 1	930
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Miss Brennan, Arrankamp, Bowral			14		930
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G. Miller, Casula			15	1 Feb., 1	030
Queanbeyan Municipality (various owners)			41	1 ,, 1	930
St. Joseph's Convent, Reynold street, Goulburn		•••	5		930
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# "Pink Eye" (Ophthalmia) in Sheep.

Its Infectiousness Proved.

GRAHAME EDGAR, B.V.Sc., Veterinary Research Officer.

### Previous Opinions.

THE condition of ophthalmia, or, as it is more commonly known among stockowners, "pink eye," at times occasions owners and particularly drovers with travelling flocks considerable inconvenience. The disease has been known in this State for many years, and has been described by several writers, who generally attributed the condition to the entrance of foreign bodies into the eyes, e.g., dust (particularly during hot, windy weather), sand, hay, grass seeds, &c., also prolonged exposure to sun glare and cold winds. Systematic investigation as to the actual cause does not appear to have been previously undertaken.

### Present Investigation.

The present work was undertaken upon a flock of 1,399 Merino wethers, of which 634, or 45.3 per cent., were infected with ophthalmia at the time treatment was commenced.

Some idea of the infectious nature of the condition may be gained from the fact that when the condition was originally noticed in the flock only about half-a-dozen sheep were seen to be affected, whilst after ten days the condition was evident in over 45 per cent, of the sheep. Early in our experiments with the naturally occurring cases we found that it was possible to reproduce the condition by instilling lacrimal secretion from affected sheep beneath the upper eyelids of healthy Merinos. The condition as produced in the experimental sheep was identical in all respects to that seen in the naturally occurring cases, and we further found that it was possible to transmit the condition by this means through more than six sheep in series.

The period of incubation varies from forty-eight hours to five days, but the latter period is very exceptional, forty-eight hours being the usual period.

That the disease, having once become evident, is infectious in all stages was further established by transmission experiments upon healthy sheep.

### Three Definite Stages.

Both in the naturally occurring cases and in our experimental cases, it was possible to recognise three definite stages of the condition, each stage presenting specific characteristic symptoms.

Initially the disease is a Catarrhal Conjunctivitis, characterised by excessive lacrimation which wets the eyelashes and runs over the face. The animal shows a dislike for bright light and blinks the affected eye continuously, while a small bead of mucus may be present at the nasal canthus of the eye. The lining membrane of the eye, namely, the conjunctiva, is inflamed and its blood vessels show out prominently.

Keratilis is the second stage of the condition. In this the clear portion of the eye (the cornea) primarily assumes a smoky tint and ultimately becomes quite opaque. The conjunctiva is intensely inflamed and the eyelids are swollen, pus exudes from the eye and the animal is quite blind. This condition of blindness reacts generally upon the sheep, the least sound disturbing it and causing it to rush in any direction with its head held high, its progress being stopped only by violent contact with a fence or other unseen object. The disease usually remains at this stage until the tenth or eleventh day after the onset of symptoms, after which the acute inflammatory condition may be noticed to have decreased in intensity, with a consequent diminution in the quantity of exudate from the eye. In less severe cases, therefore, the opacity in the cornea commences to disappear upon the thirteenth or fourteenth day after the onset of symptoms, and in three days only a slight opacity is apparent, while three weeks after the onset of symptoms it is seldom possible to detect any gross lesions in the affected eye.

Alternatively to the condition commencing to clear up after two weeks, it may become intensified to reach the third stage of the condition, namely, Suppurative Keratitis. At this stage an ulcer appears on the cornea and may persist for two or three weeks. In our experiments we have noted that only one case in ten proceeds to this stage of the condition. Recovered animals are immune, but this is only local. An attack of the disease in one eye does not immunise the non-affected eye, which is readily susceptible to the disease.

Further evidence of the infectious nature of the condition was shown in two lots of sheep, one lot placed with affected sheep in a pen in which the grass had been mown, and other lot placed with affected animals in a pen where the grass was approximately 2 feet high. In only the latter lot did the healthy contact sheep become affected, showing that the condition is spread by healthy sheep grazing over the same ground coming in contact with stalks of grass soiled by the exudate from the eyes of affected sheep.

Certain organisms have been noticed to be constantly present in the exudate from affected eyes, but the subsequent instillation of cultures of these organisms into the eyes of sheep has failed to reproduce the disease.

### Treatment.

Although the disease runs a definite course and will ultimately clear up on its own account, treatment of affected animals should be undertaken. Affected animals should be drafted from the healthy sheep as soon as possible and kept isolated. A method of treatment which is most effective is the application of a 2½ per cent. zinc sulphate solution to the eyes (one dessertspoonful of zinc sulphate to half a pint of water). Dried pus around the eyelids should be removed by means of a cotton-wool pad or a piece of clean cloth soaked in zinc sulphate and the solution then instilled into the eyes. Sheep respond after one treatment, but it should be repeated three or four times to attain the most satisfactory results.

# Ulcerative Granuloma of Pigs.

W. L. HINDMARSH, B.V.Sc., M.R.C.V.S., Senior Veterinary Research Officer.

This condition, which appears to occur not uncommonly in New South Wales, is characterised by the presence of ulceration of the skin and swelling of the underlying and surrounding tissues, and frequently results in the death of the affected animal. It appears to be identical with the condition described by authors in other parts of the world as "Skin Ulceration of Pigs" and "Spirochaetosis of Pigs."

A number of cases have been received at Glenfield Veterinary Research Station during the past year. Unfortunately in all except one case the affected animals were dead on arrival and the one live animal received was in the process of recovery.

### Description of the Condition.

The condition appears to commence as a small swelling which gradually enlarges. At varying times from the first appearance of the swelling—from a fortnight onwards—the skin at the centre of the swollen part sloughs away, allowing the discharge of greyish sticky pus, and leaving an ulcerated area which does not tend to heal. The ulcer may rapidly increase in size until a large area of skin up to 6 inches in diameter may be involved, whilst in other cases it does not extend to a diameter of more than half an inch. Whilst this ulceration is extending, the swelling further increases in size. Where the skin over the swollen area has not sloughed it is brownish in colour, whilst the ulcerated area is covered with a drying, grey scab, underwhich is found grey, sticky pus.

The infection causes death of the skin which in sloughing leaves an ulcerated area, and the tissues beneath may also be similarly affected, even the bones being attacked. As a result there is a marked development of dense fibrous tissue, which constitutes the greater part of the swelling, through which run channels filled with sticky purulent material already referred to. Where the jaw is the site of the infection, death of the bone leads to loosening and loss of teeth in that area, whilst in facial affections the channels may communicate with the nasal cavity, along which the infection extends. In some cases ulceration of the tongue, lips and gums is present. Ulceration of the tongue has been so extensive in some cases as to result in the loss of 1 inch or more of that organ.

In many cases—mainly very young pigs—the head ulceration may be the only lesion present, but in other animals numerous circular ulcers may be found on various parts of the body. Sometimes these scattered lesions may affect only the skin, but in most cases a hard fibrous tumour is formed, one seen on the lower surface of the abdomen measuring 9 inches in diameter. In other cases the legs were affected, with the result that the

limb from the knee down was enormously increased in diameter, with numerous channels connecting the joint cavities with the surface. At times the scrotum may become infected by means of castration wounds resulting in the formation of a large fibrous tumour surrounding a small necrotic focus on the stump of the spermatic cord.

### Effect of the Disease.

Although the presence of ulcerative granulomata may not appear to have serious effects upon the general health of well-grown and adult pigs, there is no doubt that they may cause considerable loss amongst suckers and weaners. Thus, on one farm eighteen suckers died in a period of two months from this affection. It is more than probable that the mortality in young pigs is associated with (a) site of the lesion, and (b) greater susceptibility.

As already pointed out the young pigs are mostly affected in the head, especially about the mouth. Thus they are frequently unable to take in food, and death is hastened by lack of nutriment. Further, in young pigs the condition is rapidly progressive and it is likely that the absorption of poisonous products from the lesions is to a great extent responsible for emaciation and death.

### Cause.

Examination of smears from the lesions shows the presence of bacteria of varying morphology, but the predominating organism present is a spirochaete. This has been found in preparations from all the lesions examined.

All the authors consulted are of opinion that the spirochaete is concerned in the cause of the tumours, although other bacteria which are present may also assist in causing the condition.

### Districts where it has Occurred.

The disease has occurred in piggeries on the north and south coasts and tablelands, and recently from pigs in the dry western area of the State we have had some "tumours" which were similar to those seen in coastal districts and in which odd spirochaetes were detected. The animals in this case were wild pigs penned for fattening.

### Manner of Infection.

From examination of the lesions and the history of their occurrence one is led to form the orinion that they originate from wound infection. The head lesions in young pigs are probably due to infection gaining entrance by way of erupting teeth, since in almost all cases a socket of a tooth is involved and in some cases the most marked ulceration is around the infected tooth. The tongue and lips possibly become infected by means of small lacerations or by contact with an infected tooth.



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In view of the fact that in pigs less than fourteen days old the lesions are almost always in the mouth, one is led to believe that the infection in these cases is gained from the soiled udders of the sows.

The scattered skin tumours probably arise from small wounds; in one case pigs penned in enclosures fenced with barbed wire, showed numerous typical lesions.

In the majority of cases where the condition occurred, the sanitation of the piggeries left much to be desired. The sties were old, of rough slab construction, the yards were muddy and contained accumulated dung and debris. Even where the sties were of reasonably good construction, the yards had wet, muddy spots in which the drainage collected. These spots were used as wallows.

Where the recommendations made to place the sties in a sanitary condition or to rebuild on a new site were carried out, the disease ceased to occur.

### Control.

It will be noted from the above paragraph that this disease is practically always associated with insanitary conditions. Dirty piggeries, badly-designed pens, filthy yards and muddy wallows all may provide a suitable place for the infection to lodge, and pigs kept under such conditions may readily become infected through wounds of any kind.

The control of this condition, therefore, depends upon the strict observance of hygienic principles in the management of the piggery.

### AMERICA'S NEW FARM RELIEF MEASURES.

The Federal Farm Board created under the Agricultural Marketing Act passed by the United States Congress has been given broader powers, according to President Hoover, than the Government of the United States has ever previously conferred upon any single agency. It is charged with the task of putting agriculture on a basis fairly comparable with that enjoyed by industry, and it has been provided with ample funds for this purpose. A total of \$500,000,000 has been set aside for its use, and of this amount Congress has already made \$150,000,000 immediately available. Furthermore, the Board has been provided with \$1,500,000 for administrative purposes, and it will gradually build up a force of experts who will delve into every angle of the huge problem which confronts it.

In addition to these forces, it will have the active co-operation of the United States Department of Agriculture and the various bureaux operating under the Department, while it may call upon any other department of the Government for assistance whenever it desires to do so. The Federal Farm Board may, therefore, be described as a sort of super-organisation, not only because of the size of its task, but also because of the powers which have been conferred upon it and the facilities which have been placed at its "disposal.

# Poultry Notes.

JANUARY.

### E. HADLINGTON, Poultry Expert.

ONE of the first considerations in the new year is the matter of stocktaking, which is essential to enable the poultry-farmer to sum up his position. It is surprising to find so many poultry-farmers who do not have an annual stocktaking and can only guess at the numbers of stock they are carrying, yet this information is vital if they wish to arrive at the financial position of the farm and to sum up future prospects.

If carried out in a systematic manner the work of counting the stock is a very simple matter and by no means as difficult as many imagine. The easiest way to count poultry is to shut them in the houses overnight and count them as they are let out in the morning. If it is not possible to shut them up, it is quite easy to make a count in the yard by working them to one side and counting as they go past. In taking stock it is necessary to know the different ages of the birds kept, and for this purpose the birds of each year should be marked with distinguishing rings. This should be done before the pullets reach the adult stage, otherwise they are likely to become mixed with the older hens, making it difficult to distinguish some of them later on. If desired the pullets can be left without distinguishing rings, provided the other hens are marked.

After tabulating the numbers of stock of different ages it will then be possible to say what laying stock is worth keeping for the coming year. On a farm carrying a regular number of layers there should be about 15 per cent more pullets than first-year hens in order to allow for normal mortality among the hens during the year and for culling.

In conjunction with the information regarding numbers of stock, it is essential to have a few simple records concerning the income and expenditure to enable a summing up of the position. In this connection the following are the main items:—(1) Cost of feed used; (2) income for the year; (3) stock or plant purchased; (4) cost of additional buildings; (5) number of eggs disposed of. From Items 1 and 2 the return for the year over cost of feeding can be worked out, while Nos. 3 and 4 will show increased assets which may have been paid for out of income and will therefore not be reflected in the banking account. No. 5 will show whether the production per hen has been satisfactory.

An important point, which should not be overlooked in arriving at the financial position, is whether the number of young stock being reared is greater than in the previous year, because any material increase will affect

the net returns and it may appear that the revenue is much less than when no additional stock was being reared, but on a stocktaking basis the assets would be increased. This is where many people starting out in poultry-farming are misled. They work up a flock, perhaps, in two years, and during this time find that the returns are very small and conclude that the business does not pay, forgetting that they are accumulating an asset in stock instead of having the money in hand.

### High Cost of Poultry Foods.

At the present time there is an upward tendency in the prices of almost every commodity used for feeding poultry. This is due to the droughty conditions in parts of the State and to the economic position. It is at such times that the use of different foodstuffs will tend towards reducing the demand for the main items such as pollard, bran, wheat and maize, even though the cost of feeding is not greatly reduced. But many poultry-farmers are at a disadvantage in not knowing how to balance the ration by using other substitutes. With a view to assisting in this direction the following alternative rations are given:—

### SUGGESTIONS FOR MASH PORTION OF RATION.

	26	GGESTIONS	TOR MEMORIA & O	MIION OF TEATION.	
(2)	*Pollard Bran Lucerne meal or c M.I.B. meat meal  Pollard Bran Paddy rice meal		. 5 100 	Pollard Bran Wheat meal Paddy rice meal Lucerne meal, chaff, or du Cocoanut-cil cake Linseed meal Meat meal	lb 35 10 12 15 10 10 4 4 100
·(3)	Pollard Paddy rice meal Lucerne meal, che Meat meal	off, or dust.	6 100 20 20 20 13 7 100	Pollard Bran Wheat meal Paddy rice meal Lucerne chaff, meal, or du	lb 28 10 30 35 15 7 100
(4)	Pollard Bran Wheat meal Paddy rice meal Lucerne chaff, me Meat Meal	al, or dust	12 15 12	Pollard Bran Maize meal Wheat meal Lucerne chaff, meal, or dus	lb 39 10 20 st 15 6

This is the standard formula recommended by the Department and fed at Hawkesbury Agricultural College and other Government Farms.

			ALT	ERNATIVES FO	R EVE	NING FEED.				
(1)	*Wheat Maize	***	•••	lb. 67 33	(3)	Wheat Maize Paddy rice	•••	•••	•••	lb, 30 20 50
				100		•				100
(2)	Wheat Maize Paddy rice	•••	•••	40 25 35	(4)	Wheat Maize Oats Paddy rice	•••		•••	40 20 15 25
				100						100

\* No. 1 is the standard evening feed at Hawkesbury Agricultural College and on the poultry sections of Departmental farms, but the proportion of maize is varied according to price.

At the present time practically the only commodity that can be used to cheapen the ration is paddy rice, which is available at £7 10s. per ton. This works out at 4s. per 60 lb. and is therefore much cheaper than wheat and maize, but the supply is becoming shorter, there being now only about 600 tons left. With regard to its effect upon production nothing definite can yet be stated, but judging by the experiments in progress at the Government Poultry Farm, Seven Hills, it appears to be reasonably safe to use the quantities shown in the above tables. These feeding trials, in which rations containing up to 50 per cent. and more of rice are being tried out, have been running now for three months, and up to date there is no noticeable effect on production or on the health of the birds, but this cannot be regarded as conclusive, as it remains to be seen whether there is any effect towards the end of summer and during the slack season of laying.

Any changes made in the ration should, of course, be made gradually, especially at this time of the year, when any sudden change of food may cause a moult earlier than usual.

### THE APPLICATION OF SCIENCE TO AGRICULTURE.

The grasslands of the Empire, according to Sir Robert B. Greig, Secretary to the Department of Agriculture for Scotland, support at least 500,000,000 animals. If all these animals were suited to their environment, free from disease and sterility, and sufficiently nourished, their value would be far more than doubled or trebled. South Africa, through Sir Arnold Theiler and his staff, has already demonstrated to the full part of this possibility. In discovering the cause of and the means of combating certain insect-borne diseases, Sir Arnold and his associates have saved the Union millions of pounds. Equally spectacular is the biological control of noxious weeds, such as prickly-pear in Australia and the blackberry in New Zealand.

The cure of rickets in pigs, and styfsickte and lambsiekte in cattle, by the administration of bone meal and salt and other mineral mixtures, has already saved hundreds of thousands of pounds to stock farmers.

The intensive management of grassland in such great grazing countries as Australia, New Zealand, and Great Britain is only beginning, but already it is plain that production can be doubled under skilful management.

## Orchard Notes.

JANUARY.

C. G. SAVAGE and W. LE GAY BRERETON.

### Bananas.

MR H. W. EASTWOOD, Orchard Instructor, Byron Bay, reports that the severe winter and dry spring experienced last year resulted in a good deal of undersized and poor quality fruit being marketed (especially from declining areas and poor soils), but most of this has now been disposed of and during this and subsequent months growers anticipate making heavy cuttings of fruit far superior to that of recent months.

This will include a quantity of "special" grade fruit, and although all the grades at all times should be properly and honestly packed extra attention should be given to this grade. It presents obstacles in packing not common to other grades insofar as it is difficult to get a firm and solid bottom layer, an important factor in obtaining a good pack. The "overlap pack" is the most suitable for special grade fruit packed in singles. In this pack one row of each layer overlaps the other row until the layers have raised the centre of the pack sufficiently to allow the fruit to be placed concave downwards and just meeting in the centre of the case. When this stage is reached, the pack is repeated until the case is filled.

During this month and next it is not unlikely that a fair percentage of the top hands on bunches containing extra large fruit will be practically straight bananas. The most suitable method of packing this class of fruit is known as the "straight pack," in which the first layer is packed by placing the fruit singly across the bottom of the case, while the remaining space between the end of the fruit and the side of the case is then filled in with fruit of a similar grade in every respect, but placed longitudinally in the case. The second layer is packed in the same way as the first, except that it is commenced on the opposite side of the case and the layers are thus alternated until the pack is completed.

Growers are reminded that it is now obligatory for them to grade their fruit according to the recently proclaimed grading regulations. Only one size and quality fruit should be placed in each case, which must be branded as specified. Small and inferior fruit must be packed separately and not mixed with the better class article.

Care in handling, grading and packing needs no stressing as much better prices are received for the product when these points are given attention. As the carrying qualities of bananas is affected by heat during the summer months, growers should not allow the fruit to become "too full" before cutting, otherwise it is likely to deteriorate in transit. On the other hand, judgment will have to be exercised to prevent undeveloped fruit from being placed on the market.

Areas of recently planted bananas will be making good growth and they should be given every attention to enable them to become well established. The most critical period in the life of a banana plantation is during its early life, and if the young plants receive a check during this period they will take a considerable time to recover; if the check is severe they may never fully recover. Lack of attention to cultivation, etc., results in poor, weak and stunted plants, which take longer to bunch (sometimes two years), while the bunches and individual fruits are consistently small and inferior. As production increases, which seems assured in view



Why Grading Regulations are Necessary.

Bananas selected from the top layer of a case ready for despatch to Sydney. Rending from the top, the sizes are: 4½ x 3′, 5″ x 4′, 4½″ x 3″, 7½″ x 4″, 4″ x 3′, 64′ x 3½″, 4″ x 3″, 5″ x 3½″.

of the increased acreage planted during the past few years, it is anticipated that only good fruit will find a ready market, and the poor fruit produced on areas that have been neglected during the period of establishment will be hard to dispose of. A small area well cared for will give better returns than a large area indifferently worked.

### Passion Fruit on the North Coast.

Growers are now busy marketing the main crop of passions, but by the end of the month this crop will be finished. To obtain the best available price passions should be graded to size, colour and weight, and any abnormal fruit put aside. The fruit should be packed attractively in halfbushel cases, by any one form of diagonal pack, Unfortunately proper packing of passions is the exception rather than the rule on the north coast, growers failing to realise they are losing two or three shillings per half case through neglect in this respect. When the market slumps, generally about the end of the month, it may not pay to pack the fruit in half cases. It can then be dumped into bushel cases, but it should be graded.

There are no regular sizes for grades of passion fruit, but it is suggested that a grade which will accommodate the major portion of the crop should be fixed by the grower and this should be strictly adhered to. Larger fruit

should be placed in a "special" grade and smaller fruits in a "standard" grade, allowing that the fixed grade is known as "choice."

Brown spot disease has seriously affected the vines and fruit this season, again demonstrating the need for special treatment. By regularly going over the vines and cutting out all affected material and collecting and destroying all fallen leaves and fruit the disease can be satisfactorily controlled.

### Drying Sultanas.

The drying of sultanas will commence next month, and the following notes supplied by Mr. G. W. Beverley, Senior Fruit Instructor, Griffith, should consequently prove most helpful.

His first advice to growers is to see that the drying plant is in order; if racks are to be used, see that the tiers are well strained up, otherwise the weight of fruit is likely to sag the bays and result in "sweating" and darkening of the fruit where it has packed in thicker layers in the sagged portion of the tiers. A spreader placed across the centre of each bay will help to keep the tiers taut. If wooden trays are to be used they should be scrubbed clean with hot water and allowed to dry thoroughly. A clean tray is a decided help in obtaining a good colour, and makes it an easy matter to turn the fruit on the trays. Gypsum (half a kerosene tin to a dipping tank of water) is very useful for removing old lye from the trays, leaving the trays smooth and white. Caustic soda, on the other hand, has a tendency to make the wood splinter. Of course, the best plan is to clean up all trays at the end of the season, and ît will then only be necessary to dust them at the beginning of the next season.

Many growers on the Murrumbidgee Irrigation Areas commence picking their sultanas a week or two before they are ready, the fruit at times only giving a Beaume test of a little over 11 degrees. Such fruit is generally sour to the taste and dries out so light that there is a considerable loss when it is graded, due to the blowing out of very light berries. The fruit should show a Beaume test of at least 12 degrees before picking.

During unsettled weather it is safer to leave the fruit on the vines, as it is gaining in sugar content every day and the air passing through it will help to dry it, whereas if picked when wet it has a tendency to mush in the tins.

The strength of the lye solution used should be 1 lb. caustic soda to 25 gallons of water, and the temperature of the dip should be 190 degrees Fahr. This recommendation is based on the results of experiments carried out two seasons ago by Mr. Beverley, and since tried out with success by several growers. As the sugar content increases and the fruit becomes riper, a slightly higher temperature may be used, but it is advisable to keep the dip solution at the strength stated, namely, 1 in 25. It is not considered advisable to use a dip at a higher temperature than 195 degrees Fahr., except in a wet season when the bunches contain a large proportion of dark berries. It is then necessary to use the boiling dipto even up the fruit and kill any mould spores on the damaged berries. An

even grade of dark fruit is a better commercial article than a sample containing both golden and dark berries. To prevent the scorching of moderate dipped berries care should be taken to shade them, if the sun is intense, for two days after they have been dipped and spread on the trays.

Some growers favour a caustic potash dip at the strength and temperature before mentioned, finding it preferable to caustic soda in many ways. They claim that the fruit dries quicker, is more brittle on the rack when dry, and comes off the netting without clinging. There is little difference in the price of the two articles, and the keeping properties of the potash-dipped fruit is the better.

If too light a solution of lye is used and the dip is too hot, the fruit will split, but the bloom is not removed and the result is a very poor sample, having a sickly white appearance. The lye must be strong enough to remove all the bloom and to preserve the fruit in a wet season or if rain should fall after it is on the rack.

Mr. Beverley has experimented with various dips, in varying climates and under many conditions, and he gives the following as a guide to those who desire to try out the caustic potash dip:—

Beaume Test.	Strength	Temperature of Dip.			
13-14 deg. 14-15 deg.	 1 lb. caustic potash Same strength 1 lb. to 27 gallons 1 lb. to 27 gallons	to 25	· ···	.,.	183-185 deg. Fahr. 185-187 deg. Fahr. 187-190 deg. Fahr. 190-195 deg. Fahr.

The temperature of the dip should never exceed 195 degrees Fahr., nor should the strength of the lye be less than 1 in 30, except in a wet season, when, as previously stated, it is sometimes necessary to use a boiling dip. If rain should fall on the fruit on an open rack, spray as soon as possible with a solution of carbonate of potash and olive oil of the same strength as is used for a cold dip. Even hot dipped fruit can be successfully sprayed with this mixture, thereby hastening the drying and greatly improving the sample. The proportions to use are 25 gallons of water, 12 lb. carbonate of potash, and 1 pint of olive oil.

The cold dip has not found general favour with growers on the Murrum-bidgee Irrigation Area, who prefer to use the modified hot caustic soda dip. However, if it is decided to try out the cold dip, it is essential to use only the best olive oil and to get a perfect emulsion without free oil. The time of immersion varies from two to five minutes, according to the length of time required to destroy the bloom on the berries. The time of drying occupies from nine to twelve days in a good season, and the fruit must be shaded by curtains from four to six days whilst on the rack, otherwise a reddish burn will be noticeable on the fruit, which will ultimately darken.

Cold-dipped fruit should be sprayed with the same mixture in which it dipped three days after it is placed on the rack and again four days

later if the drying is not proceeding quickly enough. After the fruit is sufficiently dry to remove from the racks, it is placed in the sun on hessian to bleach out the greenish tinge it usually assumes before becoming thoroughly dry.

All cold-dipped fruit, as well as hot dipped fruit that has been sprayed with cold-dip solution, should be washed after it has been thoroughly dried to remove particles of dust. This is done by placing the fruit in clean hessian sheets and immersing it in a ½ per cent. solution of carbonate of potash to which has been added olive oil at the rate of half a pint to 25 gallons of the solution. The immersion should be for about a quarter of a minute and the fruit should be kept moving in the wash. The fruit is then spread out on clean, dry hessian on trays and left until the surplus moisture evaporates. On a warm day this will take three or four hours. The main point against the employment of the cold dip is the extra time involved in the process.

### Orchard Cultivation and Green Manuring.

During the busy period of harvesting cultivation is liable to be forgotten. Delay may be inevitable during rush periods, but it must not be overlooked that the conserving of soil moisture is chiefly dependent upon cultivation, and consequently every effort should be made to give the soil a working as soon as it has dried sufficiently after rains or irrigation.

Some growers are apt to neglect those trees, such as apricots and cherries, from which the crop has been harvested early, but although the crop has been harvested the trees still require moisture during the late summer and early autumn months to mature their buds and wood for the following season. For the same reason, where irrigation is depended on, these trees should receive their share of later irrigations.

Where conditions are favourable, green manure crops can be sown at the end of this month or during February. It is preferable to sow a leguminous crop, such as peas or tick beans, and where this is done an application of ½ to 1 cwt. superphosphate per acre at time of sowing will hasten their growth. Green manure crops should only be sown in localities where the rainfall is sufficient for the fruit trees as well as the green crop, or where there is ample water for irrigation.

The object of early sowing is to obtain a bulk of growth before midwinter so that the ploughing under the crop can be completed by mid-July. This ploughing under by midwinter is necessary to allow the crop to decay before spring, otherwise much available plant food would be locked up just when the trees were requiring it. Moreover, where water for irrigation is not available and a dry spell occurs, the crop if allowed to remain growing would deplete the soil moisture, and thus detrimentally affect the trees.

### Picking and Marketing.

From the end of this month till May, growers of pome fruits will be busy harvesting and marketing, and as results are largely influenced by the methods employed, growers are advised to obtain the leaflets available from the Department of Agriculture on picking, packing, marketing, cool storge, and export of apples and pears.

### Pests.

It should not be necessary to reiterate that codling moth bandages should receive regular and frequent attention, and that fallen fruit should be collected and disposed of by boiling, burning, or placing in an insect-proof pit.

Leaflets can be obtained from the Department on the construction of waste-fruit pits, and on the methods of control for codling moth and fruitfly.

### NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.

THE Co-operative Bud Selection Society. Ltd., has supplied the following selected Valencia Late orange buds to nurserymen during the 1929 budding season, trees from which should be available for planting during this present year:—

						Duas.
T.	Adamson, Ermington	•••		•••	•••	3,100
T.	Eyles, Rydalmere	•••	***	•••		3,500
F.	Ferguson and Son, Hurst	ville	•••		***	1,500
R.	Hughes, Ermington	***				1,000
G.	McKee, Ermington	•••	•••	•••		3,000
L.	P. Rosen and Son, Carlin	agford	(late	of Epp	ping)	11,400
Sw	ane Bros., Ermington	•••	•••	•••		500

-C. G. SAVAGE. Director of Fruit Culture

### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

		401	
Dapto (E. G. Coghian) Albion Park (H. H. Baattle) Coff's Harbour (J. Walters) Klama (G. A. Sommerville) Berry (Geo. Gillam) Wollongong (W. J. Cochrane) Tahmoor (A. G. Crook) Leeton (W. Roseward) Nowra (H. Rauch) Milton (F. Cork) Kangaroo Valley (L. W. Vance) Pambula (L. K. Longhurst) Coonabarabran (Les. Byrne) Newcastle (P. Leegoe) Uralla (D. G. Evans) Oberon (F. H. Kelly) Gunning (H. E. Ardill)	Jun, 10, 11.  17, 18.  25, 27.  25, 27.  31, Feb. 1.  Feb. 6, 7, 8.  71, 12.  13, 14, 15.  19, 20.  21, 22.  25, 26.  Mar. 1  27, 28.	Moss Vale (W. Holt) Rydal (H. Murray) Gundagai (P. J. Sullivan) Macksville (George Hughes) Nimbin (S. H. Kilmister) Dorrigo (J. H. Skeoch) Bowral (E. Waine) Bombala (P. J. Jonas) Taralga (W. N. Fitzgibbons) Batlow (C. S. Gregory) Young (T. A Tester) Kempsey (E. Mitchell) Campbelltown (R. A. Sidman) Gresford (A. E. Brown) Dungog (W. H. Green) Camden (G. V. Sidman) Goulburn (Major Harris)	Mar. 6, 7, 8.  7, 8,  11, 12,  11, 12,  12, 13,  14, 15,  19, 20,  21, 22,  25, 26,  26, 27, 28,  27, 28, 29,  28, 29,  Apr. 2 to 4,  3, 4, 5,
Newcastle (P. Leegoe)  Uralla (D. G. Evans)  Oberon (F. H. Kelly)	, 25, 28, Mar. 1 , 25, 26, , 27, 28.	Campbelltown (R. A. Sidman) Gresford (A. B. Brown) Dungog (W. H. Green) Camden (G. V. Sidman)	,, 28, 29. ,, 28, 29. Apr. 2 to 4. ,, 8, 4, 5.
Robertson (J. K. Hamilton) Bowraville (A. H. Newman) Braidwood (B. L. Irwin) Mattiand (M. A. Brown) Wallamba (E. A Carey)	28, Mar. 1 Mar. 4, 5. , 5, 6. , 5 to 8	Orange (G. L. Williams) Grafton (L. C. Lawson) Young Sheep Show (T. A. Tester) Wagga (F. H. Croaker) Junee (G. W. Scrivener)	May 6, 7, 8, ,, 7 to 10, July 30, 31, Au t. 29, 27, 28, Sept. 2, 3.

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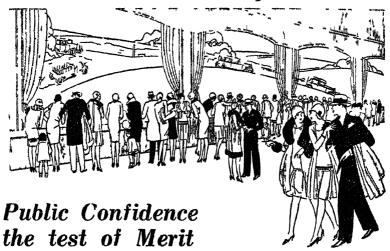
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1st February, 1930.

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Agricultural Gazette of New South Wales.

# Championship Field Wheat Competitions.

THE JUDGES' REPORTS.

### Riverina Wheat Area.

H. C. STENING, H.D.A., Chief Instructor of Agriculture.

THERE were ten district societies in the Riverina wheat area which organised field wheat competitions, the winners of which were eligible to compete for the championship conducted by the Royal Agricultural Society. In view of the very unfavourable season experienced, the number of entries was very gratifying; there were only two societies which refrained from holding a competition, while the two societies on the Murrumbidgee Irrigation Area conducted competitions for crops grown on irrigated land and were consequently not eligible to compete for the championship.

The societies whose entries were judged were Ardlethan, Ariah Park, Barellan, Barmedman, Berrigan, Deniliquin (Farmers and Settlers' Association), Lockhart, Narrandera, Oaklands (Farmers and Settlers' Association), and West Wyalong. This is the first year that Deniliquin has been represented in the championship competition, and its example, as well as the rearrangement of the boundaries of the wheat areas for the purposes of the competitions, should encourage societies in other Riverina outposts to enter the lists of these inter-district contests.

Judging was commenced at Wyalong on the 25th November, and was completed at Oaklands on the 29th November.

### The Season.

The rainfall during the fallowing period, from August, 1928, to March, 1929, was extremely low, ranging from 366 points at Barellan to 611 points at Berrigan, with an average of less than 5 inches. A good rainfall of a patchy nature was experienced during March, while early in April heavy general rains were registered much in excess of the average for this month, and high hopes were entertained for a very favourable season. propitious commencement of the season, however, was not sustained, for no further serviceable rains were received until near the middle of August, and with the lack of a reserve of moisture in the fallows the moisture resulting from the autumn rains was soon dissipated. In consequence, the moisture in the soil was very irregularly distributed, and germination, particularly on the heavier soils, was patchy. The crops were checked as a result of the dry winter months and were extremely backward in August, but made a wonderful recovery after the beneficial rains during that month. Towards the end of September the crops were again languishing, and being very backward in maturity it appeared as though nothing but a miracle could save them, but good rains during the closing

days of September again saved the situation, and although the October rainfall was below average the prolonged cool weather and light showers supplied ideal conditions, which allowed the backward crops to mature and furnish satisfactory yields. The rainfall during the actual growing period, from the sowing to the ripening of the crop, averaged 5% inches for all districts in the division, and was as low as 4% inches at Barellan.

### The Placings in the Championship.

The prize-winners were:-

G. Gow, "Hughenden," Barellan (Barellan Society)	1
R. H. B. Webb, "Woodstock," Berrigan (Berrigan Society)	2
F. J. Scott and F. S. Breaden, "Bolagamy," West Wyalong	
(West Wyslong Society)	3

The championship was won by a fine crop of Yandilla King, which was estimated to yield 31 bushels per acre and was entirely free from weed growth. It ranked high as regards purity and evenness, and the only detracting feature was the presence of flag smut. There was a little green second-growth which would probably be responsible for a delay in harvesting, but as Yandilla King holds its grain satisfactorily, there was little cause to fear loss from shedding. The soil in which this crop was grown was a self-mulching loam, which, in its virgin state, had been timbered with belar, box, and boree; it had received a twelve months' fallow which had not been ploughed, the initial cultivation being performed early in May, 1928, with a springtoothed cultivator, and the fallow was again cultivated a couple of weeks later with a rigid-time scarifier. It should be mentioned that the land had been ploughed deeply in 1927, and produced a very light crop.

Mr. Gow's success is all the more creditable when it is considered that the rainfall at his farm was the lowest in the competition. For the full eighteen months, from the time of fallowing in May. 1925, till October, 1929, the total registration was only 13.16 inches, while the precipitation for the twelve months ending July. 1929, was a meagre 6.69 inches. The excellent result achieved under such unfavourable conditions can be attributed to the intelligent care and judgment with which the cultural methods were performed.

The second-prize crop was of the Nabawa variety, estimated to return the highest yield in the competition, viz., 32 bushels, even though the crop had been fed off till 13th August. It was remarkably free from flag smut, but only just reached pure seed standard, and was marred by the presence of wild oats and wild mustard. The soil was a red loam over which was 2 inches of sand, which served the purpose of an efficient mulch.

Nabawa was also successful in securing the third prize. There was a fair sprinkling of strangers, reducing the crop to below pure seed standard, and it was an emphatic demonstration of the resistance of Nabawa to flag smut that every flag smut-infected plant which possessed a sound ear on the stool was identified as a variety other than Nabawa, chiefly Varatah.

### Lessons from the Competition.

Cultural Methods.—The average yield of the crops competing for the championship in the Riverina division was 28.7 bushels per acre, and the fact that such a satisfactory result was obtained in a most erratic season, with the light rainfall of 5 to 6 inches during the actual growing period, is a tribute to the value of the scientific cultural methods that were  $\varepsilon$  dopted.

In practically every instance the land was fallowed early in the winter, and thus advantage was taken of the best period of the year for conserving moisture in the soil, for the rainfall is invariably more abundant in these districts and the rate of evaporation lowest during the winter months. The very essential cultivation of the fallows in the spring months was also attended to, while owing to the absence of rains during the summer months in most districts subsequent cultivations were unnecessary until just prior to sowing.

Reference might be made to the method adopted by the winner of dispensing with the plough in the preparation of the fallow. The substitution of the rigid-tine scarifier for the plough is a practice that is recommended for the initial cultivation of soils of a self-mulching nature which are difficult to compact. These soils do not set hard after heavy rain, and the shallow cultivation, therefore, is not a disadvantage, but it is advisable that the land should be given an occasional shallow ploughing. On the other hand, heavy clay soils require a fairly deep ploughing for they have a tendency to run together and become too firmly consolidated after heavy rain.

Varieties.—In this competition, as in that judged in the western wheat area, Nabawa was the most successful variety. The three entries of this variety filled second, third, and fourth places in the awards, and one was estimated to return the highest yield in the competition, again proving the value of this variety as a bag-filler under exceptionally dry conditions. The success of Nabawa, coupled with its ability to resist flag smut, must lead to an extension of the area sown with this variety next season, and it is unfortunate that the crops inspected in this competition were not of a higher standard of purity.

By winning the championship in such a dry season Yandilla King has greatly added to its reputation, for it is the general impression that late-maturing varieties are not very suitable to resist drought. It has been the most successful variety on Mr. Gow's farm for very many years, and provided it is sown reasonably early on well-fallowed land it will very rarely disappoint.

As in the western competition,\* Penny has shown its ability to stand up to dry conditions. It is a hardy variety which is proving very suitable on light mallee soils.

Waratah was successful in winning two local competitions in spite of the fact that crops of this early-maturing variety were rather advanced to receive as much benefit from the late September rains as did the varieties

<sup>\*</sup> Report of the Western Wheat Area competition commences on page 87 of this issue.

of later maturity. There is a tendency, however, for this variety to lose favour, chiefly on account of its susceptibility to flag smut and its liability to shed its grain.

Currawa is not very extensively grown in this division, its use being almost entirely confined to the light mallee soils, for which it has proved eminently suitable, but it is not so satisfactory under more favourable conditions owing to its brittle straw. It is fairly resistant to flag smut and rust.

In Victoria there is a greater area sown with Free Gallipoli than with any other variety, and it appears a promising variety in the southern parts of our State. Flag smut, however, was prevalent in the one entry represented in the championship.

Seeding Operations.—There was a variation in the time of sowing from mid-April to the 9th June, the latest date being for a crop sown on black self-mulching soil in the Barmedman district.

The rates of seeding ranged from 55 to 75 lb. per acre, with an average rate of 63.8 lb. per acre, and the quantity of fertiliser applied varied from 56 to 112 lb. per acre, and averaged 79.6 lb. per acre. While these average quantities of seed and superphosphate may be regarded as suitable for adoption throughout this division, still the grower should be influenced in the determination of the rate of seeding by such factors as the stooling capacity of the variety, size of seed, fertility and condition of the soil, and time of sowing, while the quantity of superphosphate should be governed by the time of sowing and the nature of the soil.

Two crops in the competition were fed off with sheep till near the middle of August, no doubt owing to the desperate need for feed for the sheep, coupled with the parlous condition of the crops at the time. The sheep were removed when the August rains were received, and the crops benefited by both the August and September rains, and the protracted cool spring was particularly favourable to them. The grazing of crops so late in the season, however, cannot be recommended in general practice, as it would be extremely risky under average conditions.

Diseases.—Every competitor adopted the dry copper carbonate method of treating the seed for bunt prevention, and all entries with the exception of one crop were free of the disease. In this case, the seed that was sown contained bunt balls, and evidently was badly infected. While copper carbonate has proved very effective for the treatment of lightly infected seed and in eliminating even a slight trace of the disease, still there is no treatment which has given entire satisfaction in general practice for the treatment of badly infected grain, which should be discarded for seed purposes.

With the exception of the three crops of Nabawa, which were notably free from the disease, flag smut was much in evidence in all crops inspected. No doubt, imperfectly compacted seed beds and the unfavourable conditions for germination were responsible for the prevalence of this disease. Every year a very heavy toll is exacted from the wheat yields by

DETAILS of Awards.—Riverina Wheat Area.

	Total points.	135	183	132	131	130	129	128	1262	125	124
	*Cleaniness (Max. 30 points.)	90	97	88	23.	28	294	25 (28)	53	89	**
ی	Condition. (Maxi- nium 10 points.)	9	G	67	9	0	20	9	<b>5</b>	9	9
warded	Evenness. (Maxi- mum 20 points.)	10	183	181	181	18	113	10	181	101	119
Points Awarded	Freedom from Disease, (Maxi- mum 30 ponts.)	22	293	62	168	8	72	27	24	56	26
ы	Trueness to Type. (Maximum 20 points.)	10	18	17	18	118	193	13	16	184	18
	Apparent Yield. (One point for every bushel.)	•	ei ei	30	ន្ត	70	92	31	06	42	25
.1	Rainfall during effective period, April to Octobe	inches 6-78	7.61	8.90	2.17	8-17	09 9	:	8.48	90-98	8-83
.7	Number of Crops grown previously	Over 6	Old land.	12	Old land.	20	3	5th crop.	Old land.	:	12
CE L-	Quantity of Super a req standard	<del>2</del> .8	75	99	112	70	€	8	8	86	80
	Quantity of Seed per Acre.	69. 19.	5	3	88	9	70	99	99	55	75
	Иреп вопп.	End April.	First week May.	9th May.	First week May.	End April.	9th June.	Early June.	May	April.	Third week April.
	Methods of Cultivation.	Springtoothed May, scarified 3 inches end of May, springtoothed	June, introwed before sowing. Ploughed 4 inches in June, spring- toothed September, scarlind in February and March, crop fed off	val and August. Ploughed 44 inches in September, springtoothed in February and March.	Ploughed 44 inches in June, spring- toothed September, searlifled in October and November, and again in February, March and	Ploughed 3 to 4 inches in June, springtoothed August, harrowed end August and in January, springtoothed April, searlified to the construction of t	E	Ploughed 3 to 34 inches in July, springtochied in October and	marten, foned public sowing. Ploughed 4 to 44 inches in June- July, springtoothed October.	Ploughed 34 inches in July, spring- toothed in February and April.	Ploughed 5 inches in July-August, harrowed October, springtoothed March, crop fed off till August.
_	Variety.	Yandilla King	Ваража	Мараwа	Nabawa	Penny	Waratah	Waratah	Canberra 36 acres, Federation 9 acres, Bena 6	Currawa	Free Gallipoli
	Society.	Barellan	Berngan	West Wyalong.	Lockhart	Narrandera	Barmedman	Ariah Park	Deniliquin	Ardlethan	Oaklands
	Name and Address of Competitor.	Geo. Gow, Hughenden,	B. H. B. Webb, Woodstock, Berrigan.	F. J. Scott and F. S. Breaden, Bolagamy,	f. M. Gollasch, Pine Park, Milbrulong.	Elwyn Bros., Ruby Park, Colinroobie.	Maguire and Fehon, Aorangi,	H. A. Davey, Ariah Park.	Norwood Co., Norwood, Deniliquin,	P. Corcoran, Weercona,	G. Duncan and Sons, Eversleigh, Daysdale.

flag smut, and greater attention to control measures is required, not the least of which is the provision of a firmly compacted seed bed to ensure rapid germination. Other factors which will assist in the reduction of the ravages of the disease are a good stubble burn, the growing of resistant varieties, the adoption of a definite system of the cultivation of oats in rotation with the wheat crops, and the substitution of oaten chaff for wheaten chaff as feed for horses.

### Central Slopes Wheat Area.

E. S. CLAYTON, H.D.A., Senior Experimentalist.

There were thirteen entries for the Royal Agricultural Society's Cup, offered for the champion wheat crop of 50 acres grown on fallow in the central slopes wheat area. Considering the adverse season the number of entries was particularly gratifying.

The average yield of all the competitors was estimated at 25.3 bushels per acre, which in such an exceptionally dry season shows that considerable advance has been made in the art of wheat growing. Modern methods and the keen judgment of the competitors have this year produced excellent crops, although the rainfall for the year and for the growing period was below that of the severe drought year of 1902.

The Season.

RAINFALL on Fallow and for Growing Period.

<b></b>			Growing Period,							
District.		On fallow.	April,	May.	June.	July.	August.	Sep.	Oct.	Total.
Bribbarco Canowindra Cowra Cudal Forbes Manildra Parkos Quandialla		in. 813 848 1,120 922 1,250 1,148 714 Not available.	in. 73 70 494 51 96 78 121 35	in. 35 50 70 92 25 64 58	in. 66 140 212 175 73 94 76 42	in. 19 25 18 31 16 20 22 19	in. 144 196 162 177 219 131 151 142	in. 211 105 88 124 76 68 65 131	in. 75 133 100 73 42 86 114 74	in. 623 719 1,144 723 547 541 607

Although many of the crops were not sown till May, the rainfall is shown for the average growing period (April to October, inclusive) in order to give a true indication of the position with regard to moisture. Rain falling immediately prior to sowing can have a very beneficial effect on the crop. It enables many weed seeds in the fallow to germinate so that they can be destroyed before sowing, and, of course, ensures a more even and stronger germination of the wheat.

The season was exceptionally dry, in fact at most centres the rainfall was less than in 1902, in which year crops completely failed in New South Wales. A study of the rainfall and the yields reveals some particularly interesting information. Although the rain this season was generally received in light showers, and some was thus lost by evaporation, it is surprising to see how much wheat was produced per inch of rainfall. Parkes, where the rainfall for the growing period was 6 inches, Mr. Johnson. by exceptionally good farming and the exercise of keen judgment, succeeded in producing a crop estimated to yield 31 bushels, which is a little over 5 bushels per effective inches of rain. This shows what is possible when good methods are employed. The Forbes and Manildra crops also yielded 5 bushels for every effective inch of rain, Cudal 4, Canowindra 4, Cowra 3, and Bribbaree just a little under 4 bushels for each inch of rain that fell in the period April to October. This shows that a very high standard of farming is practised by these competitors. In Victoria it is generally accepted that under really good farming methods it is possible to produce 3 bushels of wheat for every effective inch of rain, but this standard has been greatly exceeded in this competition, which must be considered a very creditable performance.

The fact that such crops were produced in such a dry year shows how wheat growing methods have improved since 1902. In that year more rain was actually received during the growing period than was the case this year. At Parkes in 1902 the rainfall from April to October, inclusive, was 663 points, while this season only 607 points were received. At Forbes the rainfall for the period was 720 points in 1902, whereas this season it was only 547 points. In spite of this, Messrs. Sherritt Bros. at Forbes grew a crop estimated to yield 27 bushels per acre. This shows that had the comparatively advanced methods of the present day been in vogue in 1902, reasonably satisfactory crops would have been produced instead of the widespread failure that was experienced that year.

These crops show what the best men in the different districts can do in dry seasons. There are many other men in these districts whose standard of farming is almost if not quite as good as that of the winners, but unfortunately there is still a great number who do not farm with sufficient care and thoroughness, and in seasons like this their crops fail.

### Methods Employed by the Prize-winners.

Mr. F. C. Rowlands and Sons won the competition with 5½ points to spare with a very heavy crop of Waratah. The fallow had been mouldboard ploughed 5 inches deep in September, harrowed in October, scarified to a depth of 2½ inches and harrowed in February, then disced lightly in May. Sheep were run on the fallow to consolidate the subsurface soil and keep the weed growth eaten off. The crop was sown with a drill on 10th May, 66 lb. of graded seed (treated with copper carbonate) and 80 lb. of superphosphate per acre being applied. The soil on which this crop was grown is a very fertile loam, brown to red in colour, of medium texture, about

DETAILS of Awards,—Central Slopes Wheat Area.

***************************************	Total points,	1351	130	128	1273	127
	,esoutheodo* (Leanth of the context)	şî	88	Sã	57	72
-	F -izaM). noilibno'.	<b>a</b>	oc oc	1-	•	20
	Myenness, (Maxi-	181	. 81	8	2	<u></u>
T. Lat.	Freedom from Disease. (Maxi- mum, 30 polnra.) Hvenness. (Maxi- mum, 20 polnra.) Lindillon, (Maxi- Londillon, (Maxi-	25	20	25	<b>18</b> 2	22
	Truences to Type. (Maximum, 20 points.)	19	193	61	81	22
	Apparent Yield. (One point for every bushel.)	98	<b>25</b>	9,	27	30
	Rainfall during effective period, April to October.	points.	607	723	176	. ,
	Number of Crops grown previously.	Old land.	Old Land.	Old	and a proposed one can can	Old lami
	Quantity of Super- phosphate per acre.	.e. 8	98	9	0.2	ផ
$\cdot$	Quantity of Seed per acre.	66 66	59		2	8
	Мһеп вомп.	10th May (drill)	16th May	Combined 22nd April and har- rowed after.	18th April	Combined 5th April.
	Methods of Cultivation.	Monidboard ploughed 5 inches deep in Septembr, harrowed October, scarified and harrowed February, disce ? 24 inches in May.	Summer fallowed January, 1938, with disc plough to depth of 34-inches, like cultivated 3 inches in June and July, scarlided in September, 3 inches deep and again in February, springtoothal 2 inches in March, harrowed in March, and springtoothed shallow in April.	Monidboard ploughed 44 inches in Angust, springtoothed 24 inches in October, harrowed in November, springtoothed 24 inches in January.	Dise ploughed 8‡ to 4 inches in Aug- ust, asim disced in February, springtoothed in March to full depth, harrowed early in April after rain.	Disc ploughed 64 inches in June-July, disced October, harrowed February.
	Variety.	Waraful	Waratah	To be a second	Nabawa	Yandilla King
	Society.	Слита	Parkes	Cudal	Forbes	Grenfell
	Name and Address of Compelitor.	F. C. Rewlands and Sous, Werribee, Waugoola.	g. J. Johnson, lona, Gunningbland	H. J. Balcomb, Tekoona, Toogong.	Sherritt Bros., Back Walla Walla, Forbes.	W. J. McCaffrey and G. Sloane Moorilla, Grenfell.

126	1233	118	1164	115	116	114	1123
88	25	61 60	23	25	24	50	23
-	8	<b>r</b> -	- F-2	7	œ		2
17	17	17	-	16	17	18	15
27	27	58	27	50	8	27	88
8	181	16	18	11	18	18	183
50	88	27	<del>1</del> 67	24	83	2	16
:	719	541	Ē	623	:	:	447
2	2		First crop	Old land	=	:	s
67	70	08	22	80	56	N	112
9	72	76	90	09	09	67	02
16th May	Combined 21st May.	Combined 10th April.	Combined 20th April.	Combined end May and early June.	Combined 15th April	Combined 9th April.	Combined 28th May.
Disc ploughed 5 inches in September, harrowed November, spring-toothed January, harrowed February, springtoothed April and May.	Mouldboard ploughed 44 inches in August, springboothed 3 inches in Springboothed shaloh, springboothed shallow in Much, rolled before sowing.	Mouldboard ploughed 4 inches deep Combined in August, springtoothed deep in 10th April. February, and again (shallow) with broad tines in March.	<b>F</b> E	Mouldboard ploughed 4 inches in June, harrowed in August, half area springtoothed in November, and whole area in March.	Mouldboard ploughed 4 inches in August, springtoothed full depth in February, harrowed March, sheep on fallow.	Rigid tine scarthed 4 inches deep in June, springtoothed twice in Feb- ruary 24 inches deep.	Monidboard ploughed 3½ inches deep, January, 1929, diseed 3 inches in May, expingnocthed full depth in August, scattled 1½ inches deep in March.
Waratah	Waratah	Manildra Yandilla King	Yandilla King	Waratah and Bena,	Turvey	Turvey	Marshalls No. 3.
Бидочта	Canowindra	Manildra	Cumnock	Bribbaree	Molong	Wellington	Quandialla
O'Neil and M. D. Bowen, Yarrangah, Murga.	B. Nash, Woolombeen Canowindra,	Murray, Green Grove Manildra,	. P. Barnes, Hillview, Cumnock.	H. Peel, Moonabha, Bribbares.	radley Bros., Woodleigh, Garra.	Spring Mt., Ponto.	. Batter, Oaklands, Brlbbaree.

\* First crop, 24 points; second, 25; third, 26; fourth, 27; fifth, 28; sixth, 29; over six crops, 30 points.

1 foot deep, and then merging into a red clay subsoil of excellent waterholding capacity. The crop was well headed, even, and well up to pure seed standard, and was estimated to yield 36 bushels per acre.

Mr. E. J. Johnson, of Gunningbland, near Parkes, gained second place with a very nice crop of Waratah. The soil on which this crop was grown was a heavy red to brown loans of a self-mulching character and very fertile. The original timber on this country was Myall. The land was long summer fallowed in January, 1928, with a disc plough to a depth of  $3\frac{1}{2}$  inches, then disc cultivated 3 inches deep in June, again in July, scarified 3 inches deep in September, again in February, springtoothed in March to about 2 inches, harrowed in March, and springtoothed shallow in April. This fallow was very well worked. The disc cultivator, although objectionable on most soils on which a cloddy surface mulch is to be maintained, is not objectionable on these self-mulching soils which do not need the cloddy type of mulch to preserve the moisture.

The crop was sown with a combine on 16th May, and harrowed two days after sowing. Sixty-one pounds of graded seed (treated with copper carbonate) and 86 lb. of superphosphate per acre were sown. The crop was exceptionally true to type and free from strangers, and was estimated to yield 31 bushels per acre.

Mr. H. J. Balcomb. of Toogong, gained third place with a well-grown crop of Turvey. It was grown on a light textured loam of a light-brown colour and about 1 foot deep, then merging into a yellow clay subsoil. The land was fallowed in August with a mouldboard plough to a depth of  $4\frac{1}{2}$  inches, then springtoothed in October  $2\frac{1}{2}$  inches deep, harrowed in November, springtoothed  $2\frac{1}{2}$  inches deep in January, and stocked heavily with sheep. It was sown with a combine on 22nd April and harrowed after sowing. The seed was graded and treated with copper carbonate, and sown at 65 lb. per acre with 60 lb. of superphosphate.

### Varieties.

Waratah was the most popular variety, and it again demonstrated its ability to yield heavily on a wide range of soils in a dry season. It is remarkable how well the heads of this variety fill in spite of dry conditions. Its chief disadvantage is its liability to flag smut, and it will be noticed that most of the Waratah crops lost points for disease. However, they were well grown and even and withstood the dry weather exceptionally well.

Nabawa was entered at Forbes, and it was practically free from disease. This variety, in addition to being almost immune to flag smut, has, during the past three years, shown its ability to yield well even under dry conditions. This is a particularly valuable combination of desirable qualities, and it accounts for the rapidly increasing popularity of Nabawa. So far as drought resistance is concerned, it seems to rival Waratah and yields quite well under very dry conditions. The success of this variety in resisting flag smut suggests varietal rotation as a means of stamping out this

disease. On those paddocks most heavily infected with the disease it would be wise to sow Nabawa for one or two crops, then come back on to Waratah or any other high-yielding variety that yields well in the district. In this way about one-third of the cropped area would always be sown to Nabawa until the flag smut infection of the farm was reduced to a minimum.

### Comments.

The season was extremely dry in the early portion and then in some districts good rains were received so late in the season as to be of little use to the crop. These late rains, however, resulted in the production of second-growth heads in most of the crops. This was a serious disadvantage, as harvesting was interfered with.

The standard of the crops throughout the competition was most satisfactory. As pure seed crops they were of high quality. One very gratifying feature to the Royal Agricultural Society, and also to the local agricultural societies concerned, is the fact that even those competitors who were lowest on the list scored very well for trueness to type and purity, freedom from disease and cleanliness, thus showing that all those factors which the farmer has control over had been carefuly attended to, and it was only in the matter of yield that they were below the winning farmers.

### Western Wheat Area.

H. C. STENING, H.D.A., Chief Instructor of Agriculture.

For the purpose of the championship field wheat competitions the districts throughout the wheat belt have been regrouped so that a more equitable basis for competition may be provided between districts possessing somewhat similar climatic conditions. The value of this rearrangement of districts was particularly evident this year, for in no part of the wheat belt were wheat-growing conditions more severe than in the districts embraced in the western wheat area. So adverse was the season that five districts were unable to compete owing to the partial failure of the crops.

The societies which conducted district competitions and which were represented in the championship were Bogan Gate, Condobolin, Dubbo, Gilgandra, Trundle, Tullibigeal (Agricultural Bureau), and Ungarie.

Judging was commenced at Dubbo on 11th November, and completed at Ungarie on the 13th November.

### The Season.

This was the third consecutive adverse season experienced in this district, and in no part of the wheat belt were conditions more unfavourable for the wheat crops. The rainfalls during the fallowing period were very meagre, especially so during the spring and early summer months. In most districts, no serviceable rain was received on the fallows until the first week in April, but as this was not followed up, the soil dried out rapidly as

the result of frequent winds and the lack of reserves of subsoil moisture. Droughty conditions continued throughout May, June, and July, and just when the wheat crops were in a very critical condition the situation was saved by good rains early in August. Dry conditions then again held sway, combined with strong winds and frosty weather, as the result of which the crops in this division were rapidly blighting off, but again good saving rains were experienced at the end of September, thus averting an almost complete failure of the wheat crop in these districts. With the expectation of warm weather and with soil moisture reserves at a minimum, it was considered that abnormally favourable spring conditions would be required to ensure payable yields, but the unexpected happened, and protracted cool weather and light showers during October and November provided the best spring conditions experienced for many years and assisted the final development of the wheat crops in a remarkable manner, thus considerably improving the yields.

## The Leading Crops.

The particulars of the prize-winners are as follow:-

N. H. Hubbard, "The Wilgas," Wongarbon (Dubbo Society) ...

S. Thompson, "Tarrawona," Yalgogrin North (Ungarie Society)... 2

W. Burrell, "Woodside," Bearbong (Gilgandra Society)...

Details of awards and of the cultural methods of each competitor's crop are shown in the accompanying table.

The entry which won the championship was a crop of Nabawa, estimated to yield 26 bushels per acre on a very low rainfall during the period from sowing to the ripening of the crop, and in which only one plant was detected that was infected with flag smut. The success can be attributed both to judicious cultural methods, which were the best of all the entries, and to the practice of crop rotation. A crop of oats was grown on the land during the year preceding the preparation of the fallow for the wheat crop.

The second-prize crop was also of the Nabawa variety, grown on new land, and estimated to return the highest yield in the competition. With the exception of a little take-all it was free of disease, but there was a sprinkling of strangers through the crop, and, as new land, it carried a penalty of 6 points.

Nabawa also formed the greater portion of the entry, winning third prize, the balance of 15 acres being of the Riverina variety. The crop was grown on alluvial loam, and lacked uniformity, portions of the crop being very heavy. No flag smut was seen in the Nabawa, but its presence was detected in the Riverina. Points were lost for the presence of wild oats and Mexican poppies.

## Lessons from the Competition.

Fallowing.—In such an erratic season, with low rainfalls of 4 to 5 inches during the growing period in most districts, the production of an average scre yield of 24.7 bushels for all crops competing can be regarded as very

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## DODGE BROTHERS SIX

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DETAILS of Awards, -- Western Wheat Area,

					-	.6					Points Awarded.	Award	ă.		1
Name and Address of Competitor.	Society	Variety.	Methods of Galtivation.	.пwog пэл	Quantity of Seed per Acre.	Quantity of Super- phosphate per acre	Number of Crops grown previously.	Rainfall during effective period, April to October,	Apparent Yield. (One point for every bushel.)	Trueness to Type, (Maximum 20 points.)	Freedom from Disease. (Maxi- mum, 30 points.)	Evenness. (Maxi- mum, 20 points.)	Condition. (Maxi- mum 10 points.)	*Oleanliness. (Max., 30 points.)	Total points.
N. H. Hubbard, The Wigas, Wongarbon.	Dubbo	Nabawa	Ploughed June 6 inches deep, har- rowed August, springtoothed November, February and March, harrowed March.	17th April		85.	Old Ian I.	ms. 6-99	56	9	291	19	6		1301
S. Thompson, Tarrawona, Xalgogrin North.	Ungarle	Nabawa	Ploughed 4½ inches in August; 21st April springtoothed February.	21st April	86	ž.	1st erop.	7.33†	15	18	166-	18	6	(24)	1244
W. Burrell, Woodside, Bearbong.	Gilgandra	Nabawa 36 acres; Biver- int, 15 acres.	Fallowed 1927, crop failed and was fed off; ploughed 4 inches in Jan- uary, springtoothed Plebruary, scarified and harrowed early May; crop fed off to 12th August.	mid-May	94	Nil.	Old land.	5.95	22	19	66	F	G	261	126
J. Dillon, The Vafe, Tulli- bigeal.	Tullibigeal	Nabawa	Skim-ploughed 3 inches in September, springtoothed before sowing.	27th April	99	56	6th erop.	6.88	50	81	9.0	19	- w	(29)	155
A. Crouch and ('ond G. Cole, Milby Valley, Condo- holin.	('sndobolla	Peuny	Ploughed 4 inches in July-August, springtoothed in January and February, and again before sowing.	Last week April.	20	ec	3rd erop.	8-47	98		ទីវ	118	<u> </u>	11 <del>9</del>	121
A, A. Wyatt, Eagle Farm, Guinning Gap	Bogan Gate Waratuli	Waratah	Pioughed 4 inches in July, spring- toothed in March.	mid-May	3	90	Old Isnd.	0.201	SI.	61	97		2	61	131
W. G. William son, Glenleigh, Yarrabandal.	Tryndle	Penny	Disced 4 inches in October	20th April	55	ž.	over 6	6.514	23	17	27	18	6	ដូ	11.7
* First crop, 24 † Rainfall regist	op, 24 points; l registration	points; second, 25; third, ration at a near post office.	points; second, 25; third, 26; fourth, 27; fitth, 28; sixth, 29; over six crops, 30 points. ration at a near post office.	); over six c	rops, 3(	) points		arenthe	ses is s	hown 61	In parentheses is shown the maximum if below 30.	mum fi	f belov	r 30.	

creditable. This result was made possible by fallowing, thus supplementing the limited rainfall during the growing period with the moisture conserved in the soil prior to sowing. It was the adoption of this practice that assisted crops to hold out so well during the droughty periods, and enabled them to benefit from the saving rains on the two occasions, in August and September. There could be no better demonstration than this result to emphasise that fallowing is the best drought insurance for the wheat farmer.

In consequence of the very dry conditions which prevailed during the spring and summer months, a minimum of cultivation has sufficed; no useful purpose is served by cultivating fallows when in a dry state, while on the other hand it is sometimes conducive to an infection of take-all in the subsequent crop. The depth of 6 inches to which the land was ploughed which produced the champion crop is considered excessive, but was done with the object of breaking up a hard pan. Such deep ploughing cannot be recommended as a general practice in these districts, for not only is the additional power required to plough the greater depth rarely compensated for by increased yields, but there is grave risk that insufficient rain may be received to ensure the compaction of this depth of loose soil before the sowing period. Fortunately a good fall of 4 inches was registered at Mr. Hubbard's farm in February, which would serve the purpose of compacting the soil to the full depth of the ploughing.

Varieties.—The results of this competition constitute a complete triumph for the Nabawa variety, the four entries represented by this variety filling the first four places in the awards. This success is all the more meritorious when it is considered that Nabawa is a comparatively new variety, and is as yet not very extensively grown. Since its introduction to this State four years ago, it has shown a remarkable resistance to infection by flag smut, and its apparent immunity to this disease under field conditions was confirmed on inspection of the crops in this competition. Rarely was a flag smut infected plant found in a crop of Nabawa, and then it was almost invariably identified as a variety other than Nabawa. This variety has also this year established a reputation as a drought resister and a prolific yielder under varying conditions of soil and rainfall distribution.

The success of Penny in winning two of the local competitions represented in this championship is an indication of its value as a yielder undordry conditions. As a late maturer it is a strong rival to Yandilla King for the lighter soils.

Waratah has not been so successful in this competition, and it would appear that, chiefly on account of its susceptibility to flag smut, there is a possibility of this variety being largely superseded by Nabawa, which, however, is of slightly later maturity.

Seeding Operations.—The period of sowing of the competing crops was from mid-April to mid-May, which may be regarded as the most suitable time for sowing in these districts, and in every instance the seed had been

graded and treated with copper carbonate with very satisfactory results. The rates of seeding varied from 46 to 60 lb. per acre, and the application of superphosphate from nil to 85 lb. per acre. The crop that was unmanured and sown with the least quantity of seed was grown on alluvial soil at Gilgandra. On such a fertile soil, with its greater encouragement for stooling, the low rate of seeding was quite justified, but it would be interesting to test the efficacy of superphosphate on this soil. As previously stated, the crop lacked uniformity, and although it had been fed off with sheep till the rains on the 12th August, the best portion of the crop was of good growth and density, and estimated to yield higher than any crop in the competition.

In the case of one crop in particular, the drilling of the seed had been very roughly performed, wide spaces being evident between drill-widths. While adjacent wheat plants may benefit to some extent by reason of the extra space, still, a greater opportunity is provided for weeds to flourish. Straight drilling is also the most economical, for instance, if the space of one hoe is missed with a seventeen-hoe drill, it is equivalent to a loss of 1 bushel in every seventeen.

## Northern Wheat Area.

G. C. SPARKS, H.D.A., Manager, Glen Innes Experiment Farm.

ELEVEN crops were judged in the championship of 1929, representing the following districts:—Inverell, Delungra, Moree, Narrabri, Wee Waa, Boggabri. Gunnedah, Manilla, Tamworth, Quirindi, and Coonabarabran. This is the largest field yet entered in the northern wheat area since the advent of district competitions, and it is a matter for congratulation that the northern wheat belt is now so well covered, practically every district of note being included.

The championship resulted as follows:

- J. F. Morris, "Gowrie," Gum Flat (Inverell) .. . . 1
- J. B. White and Sons, "Braymont" (Boggabri) .. 2
- James Cribb, "Kooringa," Loombergh (Tamworth) . . 3

The competition was remarkable for the evenness and general high standard of the entries, only four points dividing the first seven crops.

The Inverell crop was of Cleveland and grown on black basalt loam, being old land, cropped to maize in 1928, following a wheat failure in 1927. The land was fallowed August, 1928, harrowed in January, and disced to a depth of 3 or 4 inches. Sown in mid-May with a "combine," using 50 lb. of graded, copper carbonated treated seed without manure. The fallow was heavily stocked with sheep, but the crop was not fed off. It turned out an excellent crop, dense and well headed, standing strongly, but slightly uneven. The estimated yield was thirteen bags per acre. Points were dropped for purity owing to the presence of plants of other

varieties of wheat; for disease due to the presence of flag smut and a little foot rot, and for cleanliness due to a light infestation by black oats and variegated thistle.

The Boggabri crop of Bobin and Waratah was on a black clay loam, also old land. It was scarified in August, 1928, harrowed in March and April, and sown on 20th May with 53 lb. graded seed. This crop was dense, well headed, standing perfectly, very pure and true to type, even and absolutely weed free. The apparent yield was eleven bags, and the crop was very healthy except for a trace of flag smut in both varieties and a trace of loose smut in the Waratah only. This was the most even crop of those inspected, and shared with the Tamworth and Narrabri crops highest points for purity and type.

The Tamworth crop was Waratah, grown on red loam, summer fallowed in mid-February, harrowed a fortnight later, springtoothed late in March, harrowed mid-April, and sown late May with 58 lb. of graded seed, unmanured. The crop gave an apparent yield of twelve bags, but dropped a point on purity. Points were also lost owing to the presence of a little flag smut and a trace of loose smut and foot rot. The crop was practically weed free, but in this regard had a lower "possible" than the other placed crops, being only the fourth crop on the paddock under review.

## The Season.

The April-October rainfall ranged from 421 points at Wee Waa to 1,021 points at Quirindi, the average at the eight centres where records were kept being about 670 points. The summer rains were sufficient adequately to moisten the fallow, and the crop generally made a fairly good start. Although the cold, dry weather of early winter caused a serious check by delaying rooting, the spring was an excellent one and heavy grain yields were the rule.

Prince Administration of the Con-	Union do la Sange Regular	RAIN	FALL on	Crop a	nd Falle	w.	-	
	Beggabri.	Tamworth.	Quirindi.	Natrabri.	Gunnedah.	Manilla,	Morre.	Wee Waa.
1928.	Points.	Points.	Points.	Points.	Points.	Points.	Points.	Points.
September	•••		***	6		***	***	
October	96			76		***		
November	91			122				
December	19			92			•••	
1929.	,						Į.	
January	66		114	29		95		59
February	308		524	87		416		233
March	75		90	511		79		36
April	248	408*	197	121		229		554
May	26	1	41	11		21	20	1
June	92	82	9	192	92	90	92	117
July	62	80	50	108	61	64	40	61
August	179	274	250	149	205	278	139	80
September	88	240	202	118	. 79	112	80	69
October	100	91	182	225	100	170	170	93

<sup>\*</sup> Total rainfall between September, 1928, and April, 1929.

## Varieties.

The eleven entries included fourteen crops, the following varieties being represented:—Waratah eight times, Cleveland twice, Bobin, Canberra, Clarendon, Currawa once each.

Cleveland, which has the distinction of being the winning crop, is most successfully grown in the later portions of the district, notably about Inverell and Delungra, and it would be generally inadvisable to use it very extensively elsewhere.

Waratah is the wheat of the moment in the northern wheat belt and seems to fulfil requirements in a manner eminently satisfactory.

Bobin is not largely grown, but the other varieties abovementioned are among the recommendations of the Department of Agriculture for that territory. Farmers have always shown a marked inclination to follow closely the results of the local farmers' experiments, and are therefore quite up-to-date as regards selection of varieties.

## Rate of Seeding, &c.

Ten of the eleven entries were from graded seed, and the seeding rates ranged from 41 to 60 lb., averaging 53 lb. Again ten of the eleven were from copper carbonate dusted seed, whilst the eleventh was not treated. No bunt was noticed in any crop, however, which seems to support the opinion freely expressed in the northern districts that a few seasons' treatment with copper carbonate will completely wipe out the disease.

Crops were, on the whole, very satisfactory as regards type and purity. A very keen interest is manifested in seed improvement, and this is reflected in the general excellence of the crops which are now quite equal in this respect to those of the other great wheat areas of the State. During the past five years an extraordinary improvement in type and purity has been accomplished in the northern districts, and it is to be hoped that the successful effort will be sustained.

The Coonabarabran crop in the extreme south-west of the area covered was sown with 60 lb. of superphosphate and was the only manured crop. Up to the present superphosphate has not been found effective in increasing wheat yields; it may have a value in hastening maturity, but for the present, at least, there seems to be no justification for its use.

### Diseases.

With the exception of flag smut, the amount of disease present in the crop was comparatively slight. Leaf and stem rusts were present but not severe. Bunt was absent although one crop was sown with untreated seed. Loose smut appeared in three crops, but only a trace. A light infection of foot rot was also noted in several crops.

Flag smut, however, was present in all crops inspected, and in some cases the infection was quite heavy. This disease has shown a progressive increase of late, and the position is becoming serious. Public attention

DETAILS of Awards.—Northern Wheat Area.

*				-		·9.	-			Point	Points Awarded.	ded.		
Name and Address of Competitor.	Society.	Variety.	Methods of Cultivation.	Мьед Вочд.	Quantity of Seed per acre.	Quantity of Super- phosphate per acr	grown previously.	Rainfall during effective period, April to October. April to October. April to October. It is a feld.	Apparent Yield, (One point for every bushel,) Trueness to Type, (Maximum 20	points.) Preedom from Disease, (Maxi mum, 30 points.)	Evenness, (Maxi- mum, 20 points.)	Condition. (Maxi- hondition, 10 points.)	*Cleanliness, (Max., 30 points.)	Total points.
Gowrie, Gum	Inverell	Cleveland	Ploughed August, 1928, harrowed Mid-May. January, disced, and sown with		.66 .66	Nii. Old	7	points.   39	721 6	70 21	£	25	1. 1.	1383
Frat. Sons, Bray- mont,	Boggabri	Bobin, Waratah	Scarified August, 1928, harrowed March and April, sown with combine."	20th May.	30	:	520	- 33	3 19	<b>8</b> 9	<b>9</b>	ão.	98	1373
Boggson. fames Cribb, Kooringa,	Tamworth	Waratah	Ploughed mid-February, harrowed,' End May. springtoothed late March, har-		28	:	60	767 36	6 19	80 61	- 18	G.	÷9;	1362
Loomberan. S. R. Barnett, Spring Vale, Castle	Quirindi	Waratah	Flowerd min-April. Ploughed January, scarlified early, March, harrowed behind "com- bine."	First week May.	26	Old	Old 1.021 land.	21 37	7 - 18	595	183	ов	2.2	136
Mountain. Stratton Bros., Redeliff,	Delungra	Waratah	7	Mid-April.	52	- 41 	:		17	183	181	20	27	136
Delungra. F. P. Hosking, Boogadah,	Coonabara- bran.	Cleveland	with "combine" and harrowed. Disc pludghed September, 1928, "sundercut" February, 1929, scarified February (after rain).	Mid-April.	8	60 lb.	· 	:: ::	3 18	8	171	<b>16</b>	St.	135
. Carberry, Cadarga,	Merrabri	Waratsh	2	Late April.	#	 E	10  80	803 34	4 19	263	15	€.	30	<b>i</b> 181
Culgoora. f. E. Peachey, Clear View,	Gunnedah	Canberra, Clarendon.	February and March. Ploughed December, 1928, scarified March, harrowed April and follow-	End April	ie	54 	Old 5 land.	537 31	1 18	273	18,	9	000	133
Kelvin. C. E. Donnelly, Clontarf,	Manilla	Waratah	ing seeding.  Disced mid-February (after rain), 10th June harrowed late March.	-	3			735	30 181	77	181	<b>5</b> 3	6	132
Hanilla.  F. & W. J.  ( osh, Karoola.  Pallamallawa.	Moree	Waratab	toothed september, 1928, spring- toothed and harrowed February, harrowed after seeding; fallow	Early May.	<u>2</u>	:	 	211 3	33 18	26	Is	35	61 80	132
Swamp Oak, Wee Was.	Wee Waa	Currawa. Warstah.	neavny stockfu. Disc ploughed in January.	, April	55 55	:		121	25 18	39 	16	cn.	29	127
				0 0000		9		•	4.4.4					

\* Wist crop, 24 points; second, 25; third, 26; fourth, 27; fifth, 28; sixth, 29; over -ix crops, 30 points.

should be directed to the flag smut menace; a large amount of information regarding this disease is available, and it is very essential that there should be a clear understanding of the best methods of control.

### Weeds.

Compared with previous years there is an improvement in the cleanliness of the crops, black oats in particular being under much better control. The Boggabri crop was entirely weed free, and the production of an absolutely clean crop on old land is a performance of great merit, although, as may be anticipated, this crop was on long fallow. As has been stated on previous occasions the greatest justification for long fallow in the northern wheat districts is on the score of disease and weed control, as it seems unlikely that long fallow will give increased grain yields in normal years as compared with the system of summer fallow peculiar to this territory. It is, however, practically impossible to produce crops free of black oats unless an occasional long fallow is practised, and the policy adopted by progressive farmers is to long fallow their land once every three years.

### General Remarks.

Four of the entries were on long fallow and the remainder on short (summer) fallow, the cleanliness of the crops generally indicating that the tillage operations were intelligently directed. There seems to have been an honest effort to cultivate promptly after rain, and the value of sheep on fallow is fully realised. It will be noted that the amount of cultivation given is never excessive and must have been skilfully applied to have secured such excellent results. The use of the "combine" is now almost universal.

The wheat position in the north is very bright. In past years the statement has been voiced that one good crop was enough to delay the advancement of scientific agriculture for a decade because on these highly fertile soils it was possible to produce high yielding crops in good seasons quite irrespective of the cultural practice followed. Be that as it may, the gospel of good farming has now been accepted by the men that matter, and it is unthinkable that northern agriculture can do anything but progress. There seems now to be a complete understanding of the great fundamental fact that good farming is essential to good crops, and with the cheery optimism so pronounced in the great northern wheat belt I feel that in a very few years we shall see the standard of agriculture raised to a very high level.

## Southern Slopes Wheat Area.

H. C. STENING, H.D.A., Chief Instructor of Agriculture.

THE district agricultural societies which conducted local competitions were:—Albury, Corowa, Coolamon, Cootamundra, Culcairn, Henty, Murrumbidgee (Wagga), Murrumburrah; Temora, The Rock (Farmers and

Settlers' Association), and Young. This included the whole of the societies in this division which competed in the previous year's competitions with the exception of Burrowa.

The rainfall distribution in this division is normally more favourable for wheat growing than in any other part of the State, and even though a much better season was experienced this year in the southern portion of the division than in the northern, still there was ample justification for the new arrangement of districts.

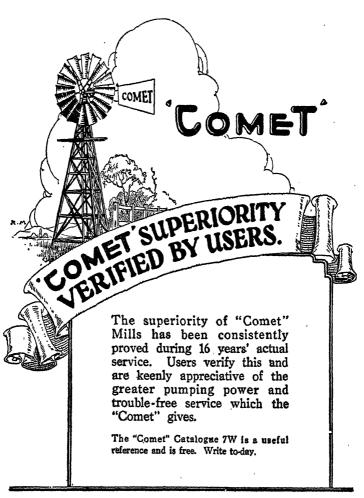
Judging was commenced at Corowa on 2nd December, and completed at Murrumburrah on 5th December.

## The Season.

The seasonal conditions were not regular throughout this division, those in the districts north of Wagga being much more severe than in the districts south of that town, in fact, the crops in the southern portion of the division scarcely suffered and were quite equal to or better than those of a normal season. The chief points of difference were that the seeding rains in April and May, and, to a less extent, in June, were more abundant in the south, thus a better germination occurred and the crops made good early growth and covered the ground, thereby reducing the rate of evaporation from the soil during the dry winter months. For the ten months of the fallowing period, from June, 1928, to March, 1929, the rainfall averaged 11.85 inches, varying from 9.70 inches at Temora to 14.07 inches at Murrumburrah. The summer was very dry, but satisfactory rains were registered in February and March. The rainfall during the effective period, April to October, ranged from 6.77 inches at Temora to 11.09 inches at Culcairn, with an average for the division of 8.40 inches. The total precipitation at Temora during the actual growing period, from the time of sowing to the ripening of the crops, was only 5.98 inches, while at Culcairn 9.68 inches were registered for the same period. In the southern districts, the rains recorded during April were generally above average, but in the north they were much below average, and as no serviceable rain fell during May, germination was very faulty, especially on the heavier soils. Droughty conditions ruled during May, June, and July, but were broken by an excellent fall of rain near the middle of August, and towards the end of September another copious rainfall was responsible for the registration for these two months being well above average.

Although the rainfall for the effective period April to October was well below the average, still the conditions in the southern portion of the division were quite satisfactory for the production of high yields with the aid of the moisture conserved in the soil by fallowing. The rains during the growing period in this part of the State is normally abundant, and it is the general experience that better yields are obtained if the season is a little on the dry side.

A severe late frost occurred on 22nd October and resulted in considerable damage to crops, chiefly in low-lying situations. Its effect was also



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## 1930 GUARANTEE

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Tooth & Co. Limited, Box 1615 BB, G.P.O., SYDNEY. noticed on some of the very late-maturing straws in some of the competition crops. As the result of the erratic season second growth occurred in many crops. This delayed harvesting, while the uneven ripening is likely to cause loss of grain with varieties which are liable to shed. Some growers are tempted to harvest before the second growth is ripe, but the presence of green grains in the sample reduces its milling value and is liable to dockage.

Details of the points awarded in the judging, and the particulars of the cultural treatment of the crops are set out in the accompanying table.

## The Leading Crops.

The championship was won by a dense well-headed crop of Nabawa, estimated to yield 38 bushels per acre and free from flag smut, as is generally the case with this variety. Considering that the land had been under cultivation for over twenty years, the crop was also reasonably free from weeds, only a very odd wild oat being present. It suffered a little on the score of purity, and there was a little variation in the maturity of the crop. The soil on which the crop was produced was a red to grey loam, originally timbered with grey box, yellow box, and buloke, and the success of the crop can be attributed to the excellent cultural methods which served the double purpose of conserving moisture and clearing the land of weed growth; the fallow had won the local fallowing competition. In June, the crop had been heavily stocked at the rate or ten sheep per acre, and the feeding off of the crop was completed in five days.

The second prize was won by a "picture" crop of Turvey, which was 5 feet tall and so very dense that it was inclined to become tangled. It was well-headed and the ears were well filled, and from all appearances at time of judging promised a yield of 40 bushels per acre. The crop was well up to pure seed standard and was almost free from disease. The presence of saffron thistles and a few oats was responsible for the loss of a few points. The crop was grown on a grey to red light loam which formally was timbered with yellow box and grey box. Much judgment was shown in the application of cultural methods. The land has been in cultivation for very many years. The last crop was grown on the land in 1926, thus being spelled for two years.

The crop which gained the third prize was of the Yandilla King variety, estimated to yield 37 bushels per acre. A few points were lost owing to the presence of a little flag smut and a few wild oats and black thistles. The crop was grown on a red loam on which the last crop was grown in 1926, the stubble of which had not been burnt. The methods adopted in the cultivation of the fallow were designed to control weed growth in addition to conserving moisture, and the result has been quite satisfactory.

Special mention is made of Mr. Moll's fine crop of Yandilla King which was estimated to return the highest yield in the competition, viz., 42 bushels per acre. Unfortunately, the presence of diseases and weed growth precluded it from winning distinction.

DETAILS of Awards.—Southern Slopes Wheat Area.

	,		TELETICS OF AWARDS.—750M	sadore mammor		W Hear	PIG.			Po	Points Awarded	varded.			1
Name and Address of Competitor.	Society.	Variety.	Methods of Cultivation.	Туреп Волуп.	Quantity of Seed per Acre.	e Teg etailtent) Le Teg etailgeoid	Mumber of Crops grown previously	guirub llainian boired evidealle fedoted of linga	A pparent Yleld. (One point for covery bushel.)	Trueness to Type. (Maximum 20 points.)	Freedom from Disease, (Maxi- mum, 30 points.)	Evenness. (Mazi- inum, 20 points.)	Condition, (Maxi- Condition of Maxis,)	*Cleanliness, (Max., 30 points.)	Total polnts.
R. K. H. King, Karindee, Uranquinty.	Murrumbid- Nahawa gee, (Wagga).	Nahawa	Ploughed 5 inches in June, har- rowed and cross harrowed July, scarfied October, scarlined four times after harvest. Crop fed off June.	6th May	÷₹	98 90.	Old land.	s 07.	66	60 60 73	, 70 <del>2</del>	10	 G	60	143
D. A. B. Gibbs, Oak Hill, Morven.	Culcuira	Turey	Ploughed 44 inches in August, springtoched 3 inches in September, springtoothed 24 inches January, scarlifed 2 inches 1st May, harrowed after drilling.	Жід-Жаў	8	5	Old land.	11-09†	9	<b>01</b>	6	9	on .	17 61	142
W. J. Scott, Elgin, Munyabla.	Невбу	Yandilla King	Disc-cultivated 14 inches early in June, harrowed July, ploughed 3; inches in September, searlifled October, harrowed February, skim-ploughed 2 inches in February, ruary, harrowed March.	Last week April.	0.2	<b>9</b>	م	10-6	5.2 1	- 5	7,71 1,71 0,1	20	\$	1.52	140
C. W. Moll, Elderslie, Gerogery.	Albury	Yandilla King	Ploughed 44 inches in July, harrowed August, scarling Soptember, end January, and early April, harrowed after drilling.	First week May.	9	113	Old 1 Land.	11-09‡	<b>4</b>	18	ie 6	1.9	o	93	139
C. and V. Brod. Young ford, Hillview, Yimba.	Young	Warstab, 25 acres, Bens, 25 acres.	Ploughed 44 inches in August, har- rowed September, springtoothed October and February, harrowed March, crop fed off to end July.	Bena: 25th April Waratah: 2nd May.	3	2	Old Linel.	5:33	gg	16!	γ n	131	72		1343

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7	ŧ	132	3	130	1203
81	55	283	÷i	21	61 55
G ,	6	-10 CD	x	G	G
10	181	19	87	181	5
88	91	27	881	27	98
£-	***! C- !**	19	17	18}	21
31	65	58	34	30	98
9-17	8 22.8	6.93	7.38	7.98	6.77
Old land.	Old land.	Old land.	Old land.	Old land.	Over 6-77 6.
3	09	#s	3	* *	8
70.k 90	8	75	8	33	ž
End April	5th May.	24th to 27th May.	1st May.	End April.	last week May.
Ploughed 4 inches in July and cross Bud April 70.6 46 harrowd, spingtoofhed September and October, scalified Jan- uary and before drilling.	Ploughed 44 inches in August, har- rowed September, springtoothed October and April, harrowed in April.	Ploughed 4 inches, 30 acres in 24th to March and balance in May, 27th May. ploughed 5 inches in August, harrowed and cross harrowed. August, and April.	Ploughed 44 inches in August, hur- rowed September, springtoothed Uctober, March, and April, crop- fed off lightly.	Ploughed 5 inches in August, han- rowed after ploughing, spring- bookhed November and before sowing. Crop fed off to flish week in August.	Plonehed 44 inches in July, scarified Last week Ortober, harrowed Pebruary, scali- fied April.
Turvey, 20 acres, Yandilla King, 20 acres, Wandilla, 10 acres.	Marshull's No. 3	Nabawa	Waratah	Union	Nahawa
The Rock	Cootamun- dra.	Сооветен	Murium- burrah.	('ргама	Temora
J. A. Goldsmith, The Rock Belyue, The Rock.	G. W. Forsyth, Glencoe, Wallendbeen.	E. H. G. Elder- shaw, Kywong, Marrar.	Bradford Bros., Wonga, Nubba.	J. F. Conroy, Erigie, Lowesdale	J. Haggart, junr. Temora Hrin Vale, Warral Warral

\* Pirst crop, 24 points; second, 25; third, 26; fourth, 27; fitth, 28; sixth, 29; over six crops, 30 points, † Rainfall registration at a near post office,

## Lessons from the Competition.

Cultural Methods.—All competitors have given intelligent attention to those phases of modern farming practice which aim at maintaining an adequate supply of moisture in the soil for the needs of the wheat crop. The production of high yields under unfavourable conditions, ranging up to 42 bushels per acre and with an average of 34½ bushels for all crops in the competition, is an indication of the success that has been attained by the competitors in their application of scientific methods to cultivation.

The ploughing of the fallow was performed sufficiently early, consistent with the climatic conditions in this division, and a soil mulch was created by cultivating the fallow early in the spring. As there is some diversity of opinion in regard to the use of the harrows, it is interesting to note that excepting in two instances the initial cultivation of the fallows was performed with the harrows. The chief advantage of the use of the harrows in the early spring is that a soil mulch is created in minimum time at a period when delay would result in a loss of soil moisture by evaporation; furthermore, it prepares and pulverises the soil which is sifted by the subsequent working with the cultivator to form the seed bed, and it also facilitates the succeeding operations with the cultivator.

It is pleasing to note that the use of the rigid-tine scarifier is becoming more general. It is significant that of the seven competitors who cultivated their fallows with this implement, four of them occupied the first four places in the awards, and had the highest yielding crops. For the shallow cultivation shortly before sowing particularly, the rigid-tine scarifier is the most satisfactory implement, for it is most effective in cultivating to a uniform shallow depth and it exerts a compressing action on the seed bed, leaving a level top to the compacted sub-surface layer. This permits an even depth of sowing in moist compacted soil, thus ensuring a ready and uniform germination and resulting in an even and vigorous crop.

Varieties.—By winning the championship and being represented in more entries than any other variety, Nabawa can be claimed to be the most successful variety in the competition. Taken in conjunction with its success in the western and Riverina championship competitions, Nabawa is well entitled to the distinction of "the wheat of the year." It is truly a remarkable performance, especially when it is taken into account that only a comparatively small area of the variety is as yet grown in this State. Whether its success will be sustained in future seasons remains to be proved, but its results in farmers' experiment plots during the past four seasons are most encouraging. It has proved itself a good yielder under varying conditions of soil and climate, resistant to drought and flag smut, and there are indications, too, that it is fairly resistant to rust.

Yandilla King runs Nabawa very close as the most successful variety, being the winner of the third prize and represented in two and part of a third entry; it also has to its credit the highest yield (42 bushels per acre) in the competition.

Turvey, by securing second prize, with an estimated yield of 40 bushets per acre, has demonstrated that it is a consistent yielder. It has not been quite so prominent in the competitions in the southern districts during the last three years as it was formerly. The same remark may be made with regard to Waratah, but the nature of the seasons has not permitted early maturing varieties to show to best advantage, and it may still be considered the most reliable early-maturing variety.

Seeding Operations.—The time selected by competitors for sowing varied from the last week in April to the last week in May, which is the most favourable period for sowing in the districts included in this division. The rate of seeding ranged from 53 to 90 lb. per acre, with an average of 69 lb. per acre. There has been a tendency in recent years to increase the quantity of seed that is sown, but results of experiments indicate that there is no justification for the adoption of such high rates of seeding as 90 lb. per acre. However, it is preferable to err in sowing too much than too little seed, for an over-thick stand can be thinned out by harrowing the crop, but if the crop is too thin it is difficult to apply a satisfactory remedy.

The quantity of superphosphate applied varied from 60 to 112 lb. per acre, with an average of 82½ lb. per acre. It will be noted that the two highest yielding crops were fertilised at the rate of 112 lb. per acre. It may be accepted as an axiom that the better the fallow the more response there is to heavy applications of fertilisers; this is due to the increased quantities of soil moisture and nitrates that are made available for the needs of the crop.

Sowing seed too shallow was the cause of many faulty germinations this season. The ideal depth for sowing is about 2½ inches, so that the seed is sown in the moist compacted seed bed. However, if there is no moisture at this depth, and it is available at half an inch to an inch deeper, then it is advisable to drill deeper into the moist soil. For this purpose the drill is much preferable to the combine. If, however, there is insufficient moisture available in the top 4 inches, the seed should be sown as shallow as possible. Should heavy rain fall shortly after sowing deeply there is a danger of the surface soil running together and the soil should be lightly harrowed.

Diseases.—The dry copper carbonate treatment was used for the prevention of bunt by all competitors. Bunt was detected in two crops, in one of which only one infected head was found, the other was the result of sowing seed that was known to be smutty.

Flag smut was much less in evidence than was the case in the competitions in the drier districts, probably as the result of the more rapid germination of the crops. As infection by flag smut takes place in the early seedling stage, i.e., between the time the grain first sprouts and the first green shoot appears, it follows that the shorter the time it takes to pass through that stage the less risk there is of infection.

## Pure Seed.

## GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested the report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity chi seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydnes. not later than the 12th of the month.

W heat—			
Aussie	•••	•••	J. Parslow, "Cooya," Balladoran.
			C. A. Wright, "Dulla Dulla," Dubbo.
Bobin	•••	•••	H. J. Harvey, "Kindalin," Dubbo.
Cadia	•••	•••	J. B. White and Sons, "Braymont," Boggabri.
Canberra		•••	W. W. Watson, "Woodbine," Tichborne.
			F. Penfold, "Bluevale," Boggabri.
			Manager, Experiment Farm, Condobolin.
			H. J. Harvey, "Kindalin," Dubbo. J. Hodgson, "Studholme," Armatree.
			J. Hodgson, "Studholme," Armatree.
			E. J. Johnson, "Iona," Gunningbland.
			W. G. Law, "Thistledown," Gilgandra.
C11 3			J. B. White and Sons, "Braymont," Boggabri.
Clarendon		•••	L. G Pryor, "Eriston," Gunnedah J. B. White and Sons, "Braymont," Boggabri.
Early Bird Federation		•••	J. B. White and Sons, "Braymont," Boggabri.
rederation		•••	W. A. Glenn, Thyra Road, Moama.
			H. J. Harvey, "Kindalin," Dubbo.
			E. J. Johnson, "Iona," Gunningbland.
			W. G. Law, "Thistledown," Gilgandra. W. Twigg, "Kirwee," Armatree.
Hard Fede	retion		H I Harrow "Vindalia" Dulla
Marshall's		•••	H. J. Harvey, "Kindalin," Dubbo. G. W. Forsyth, "Glencoe," Wallendbeen.
		•••	
Nabawa			Whitfield Bros "Gamble" Binnomer
		•••	H. J. Harvey "Kindelin" Dubbo
			J. Hodgson, "Studholme" Armstree
			W. G. Law, "Thistledown," Gilcandra
			G. R. Lee, "Oakwood." Dubbo.
			J. Parslow, "Coova," Balladoran.
			Hills, "Cunningar.  Whitfield Bros., "Gamble," Binnaway. H. J. Harvey, "Kindalin," Dubbo. J. Hodgson, "Studholme," Armatree. W. G. Law, "Thistledown," Gilgandra. G. R. Lee, "Oakwood," Dubbo. J. Parslow, "Cooya," Balladoran. W. Twigg, "Kirwee," Armatree. J. B. White and Sons, "Braymont," Baggalasi.
_			U. A. Wright "Dullo Dullo "Touble
Penny	***	•••	J. B. White and Sons, "Braymont," Boggabri Whitfield Bros., "Gamble," Binnaway. W. G. Law, "Thistledown," Gilgandra. W. W. Watson "Woodkie," "Thistledown," Gilgandra.
Riverina	***	•••	Whitfield Bros., "Gamble," Binnaway.
TT.			W. G. Law, "Thistledown," Gilgandra.
Turvey	***	•••	
			J. Hodgson, "Studholme," Armatree.
			J. Hodgson, "Studholme," Armatree. H. J. Harvey, "Kindalin," Dubbo. W. G. Law, "Thistledown," Gilgandra.
			үү. G. Law, "Thistledown," Gilgandra.
			G. K. Lee, Uakwood, Dubbo.
			F. Odewahn, Culcairn.

Feterita Saccaline

Wheat-continu	ied.		
Union .			n, Thyra Road, Moama. ry, '' Kindalin,'' Dubbo.
			"Thistledown," Gilgandra.
Wandilla .			y, "Kindalin," Dubbo.
			"Cooya," Balladoran.
Waratah .			t, "Dulla Dulla," Dubbo. son, "Woodbine," Tichborne.
waracan .			"Bluevale," Boggabri.
			, "Eriston," Gunnedah.
		Manager, E	xperiment Farm, Condobolin.
		H. J. Harve	ey, "Kindalin," Dubbo.
		E. J. Johns	on, "Iona," Gunningbland.
			"Cooya," Balladoran.
		B. J. Stock	s, "Linden Hills," Cunningar.
			"Kirwee," Armatree.
			and Sons, "Braymont," Boggabri.
Watchman			, "Eriston," Gunnedah.
Yandilla Kir	ng		ros., "Gamble," Binnaway.
			ey, "Kindalin," Dubbo.
			"Oakwood," Dubbo.
		S. E. Nash,	"Lockwood," via Canowindra.
Oats			
Mulga		Manager, E	xperiment Farm, Condobolin.
Sorghum-			
Collier	Und	Secretary, Dept.	of Agriculture, Box 36A, G.P.O., Sydney.
773			-f A - !- 14 D 00 - 0 D O C 1

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

Sumac ... Under Secretary, Dept. of Agriculture, Box 36A, G.P.O., Sydney. White African Under Secretary, Dept. of Agriculture, Box 36A, G.P.O., Sydney.

Under Secretary, Dept. of Agriculture, Box 364, G.P.O., Sydney. Mr. A. S. Pankhurst, William Street, Singleton.

## RAINFALL SUMMARY FOR 1929.

A GLANCE at the rainfall map of the State for the year 1929, which has come to hand from the Commonwealth Meteorologist, shows that the coastal districts and portion of the southern tableland meteorological divisions were the only sections of the State which received more than normal rainfall for the year. The southern tableland division was 1 per cent. above the normal, the north coast 25 per cent. above, Hastings, Manning and Hunter districts 37 per cent. above, metropolitan area 20 per cent. above, and the south coast 27 per cent. above. The remaining portions of the State were below normal for the year, the upper and lower sections of the western division being 66 and 33 per cent. below, respectively; north-west plains 25 per cent., central-western plains 41 per cent., Riverina 22 per cent., north-west slopes 16 per cent., central-western slopes 25 per cent., south-western slopes 24 per cent., northern tablelands 4 per cent., and central tablelands 3 per cent, below normal.

## Phyllanthus gasstræmii Proved Poisonous.

THE Poison Plants Committee of the Council for Scientific and Industrial Research has reported that the plant Phyllanthus gasstramii, family Euphorbiacea, has been collected in several districts in New South Wales and is invariably cyanogenetic.

## Wheat Crop-growing Competitions, 1929.

EXTRACTS FROM THE JUDGES' REPORTS.

## Parkes and Adjacent Centres.

H. BARTLETT, H.D.A., Senior Agricultural Instructor.

A now moisture content of subsoils due to scanty rains over the fallow period; fair rains in March and April, and a rather dry May making doubtfully moist seed-beds, and resulting in a patchy germination of the crops; dry conditions until mid-August, suggesting a wheat crop failure in the West; fair to medium rains from mid-August onwards, saving the crops and making possible the harvesting of a 40 per cent. yield—such is a brief history of the seasonal conditions experienced in that portion of the West adjacent to Parkes during the production of the 1929 wheat crop.

## The Rainfall.

The following table shows the rainfall for the fallow and growing periods at a number of the centres at which competitions were held:—

RAINFALL Records, 1928-29.

	Parkes Average.	Parkes.	E. J Johnson.	Forbes.	Trundle.	Bogan Gate,	Con- dobolin.	Manildra (S.Murray
	Points	Points	Points	Points	Points	Points	Points	Point
1928		Fallow P	eriod (Ju	ne, 1928,	to March	1929).		
June	237	80	114	157	133	94	85	1 171
July	187	259	192	230	165	186	165	237
August	187	87	68	73	58	68	37	77
September	170	34	36	37	34	49	40	61
October	154	130	101	96	91	136	118	188
November	142	75	56	60	57	57	57	122
December	190	Nil.	2	4	2	Nil.	11	12
1929.			,	•				1
January	210	10	13	1	34	6	3	Nil.
February	142	121	35	255	105	177	102	364
March	168	213	97	247	97	126	52	406
Total on								
fallow	1,787	1,009	714	1,160	776	899	670	1,638
		Growing	Period (A	pril to Oct	ober, 1929	.)		
April	146	117	121	131	141	135	85	78
May	159	74	58	45	58	86	43	64
June	237	97	76	129	67	94	70	94
July	187	27	22	26	25	25	40	20
August	187	219	151	189	148	148	$2\overline{47}$	131
September	170	132	65	73	82	94	147	68
October	154	66	114	66	112	84	125	86
Total dur- ing grow-			'					
ing period	1,240	732	607	659	633	666	757	541
Grand Total	3,027	1,741	1,321	1,819	1,409	1,565	1,427	2,179

## The Number of Entries.

Although crops deemed of competition standard were fewer in number than in some past years, most centres promoted a wheat crop-growing contest, the number being nine, and the total competitors sixty-five, compared with eleven associations and 145 competitors for the previous year, in which a record number of entries was received.

The following table shows the number of entries from each association for the two years:—

			No. of 1	Entries.
Association.			1928.	1929.
Forbes P.A. and H. Association	•••	•••	22	7
Parkes P.A. and H. Association		•••	15	8
Trundle P.A. and H. Association			11	5
Peak Hill P.A. and H. Association	•••	•••	5	
Bogan Gate P.A. and H. Association			19	12
Tullamore P.A. and H. Association			16	•••
Condobolin P.A. and H. Association	•••		18	11
Manildra P.A. and H. Association			11	6
Nelungaloo Agricultural Bureau		•••	14	7
Tichborne Agricultural Bureau	•••		6	6
Murrumbogie Agricultural Bureau	•••		8	
Gunning Gap Agricultural Bureau	•••			3
* * *			-	
Total entries			145	65
Total societies	•••	•••	11	9

The data collected during several years of crop judging enable the trend of the factors contributing towards increased yields to be indicated.

## Superphosphate.

The average quantity of superphosphate applied per acre to competition crops of recent years is shown in the following table:—

SUPERPHOSPHATE	Applied	$\mathbf{to}$	Competition	Crops.
----------------	---------	---------------	-------------	--------

		* *		*	4	
Locality.	1924.	1925.	1926.	1927.	1928.	1929.
	1b.	lb.	11).	lb.	lb.	lb.
Parkes	. 42	53	51	64	69	70
Forbes	42	42	51	60	58	64
Condobolin	i			l	50	50
~ ~ .		40	50	55	65	66
Fullamore			38	49	58	***
Frundle	1		40	56	65	59
Peak Hill	90	40	50	61	59	***
Manildra	1	36		62	64	70
Nelungaloo				66	69	67
Tichhama	1 .	1		54	65	58
Warman ma ha aria	1	1 ***	•••	1	52	
Toma d'acares	. 10	52	49	57		•••
Coracigory	+2	02	*8	1 .01	***	***
Gunning Gap	•{	•••	***	***	***	59

The figures show that in the production of the best crops of the localities there has been a general trend to increase the amount of superphosphate. Although 1929 has been a year when perhaps the heavier

application would not show to advantage, yet the best crops were grown with an amount at least equal to that used in 1925. While judging, many observations were made of unmanured strips which promised not more than half the yield of the adjoining area, to which 60 lb. or more of superphosphate had been applied.

All competition crops in 1929 were tertilised with superphosphate.

## The Seed Used.

The average amount of seed now used throughout the West is remarkably constant, and it appears as if the most suitable amount has been determined; as an instance, every grower in the Bogan Gate competition applied 60 lb. per acre. Pure, graded seed of high quality is now generally used.

The following average amounts of seed were used in the various districts in the 1929 competition:—Parkes, 61 lb.; Forbes, 64 lb.; Condobolin, 53 lb.; Bogan Gate, 60 lb.; Trundle, 55 lb.; Manildra, 70 lb.; Manildra, 59 lb.; Tichborne, 60 lb.; Gunning Gap, 60 lb.

All crops, except two submitted by one grower, were treated with dry copper carbonate powder as a fungicide, and not one bunted head of wheat was observed during the whole of the judging.

For each of the seasons 1928 and 1929, 197 per cent. of the crops submitted have been treated with copper carbonate.

### The Varieties.

The numbers of crops of each variety entered in the 1929 competitions were as follows:—Waratah, 27½; Nabawa, 9; Turvey, 6; Yandilla King, 6; Penny, 3; Hard Federation, 1; Lotz, 1; Canberra, 4; Federation, 2; Jay Wonder, ½; Gresley, 1; Bena, 4; total, 65 entries consisting of twelve varieties.

The placing of the varieties in the nine competitions held in 1929 was as under:—

Variety.	Number	Nur	nber of Plac	rings.		Percentage
* at 1003.	Times Entered.	1st.	2nd.	3rd.	Points.*	of Points.
Waratah Nabawa Turvey Penny Bena Yandilla King Federation Hard Federation Canberra	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2 1 1 2 1 1 1	4 3½ 1   ½ 	3½ 1 2 1 1 1 ½	17! 11 7 6 4 4 3 1	32·4 20·4 12·9 11·1 7·4 5·5 1·5

<sup>\*</sup> Points are calculated on the basis of 3 for first place, 2 for second, and I for third. Maximum number of points for the nine competitions would thus be 54.

A review of the proportions in which varieties have been entered in these competitions in recent years is interesting. The following table gives the percentage of entries of certain varieties since 1924:—

Percentage of Entries of Certain Varieties, 1924-1929.

the second second second second	Variety.				1925.	1926.	1927.	1928.	1929.
	•••	•••		28	38	23	18	14.8	6.1
	•••	•••		3.5	$13 \cdot 4$	21.6	31	46.8	42.3
Federation	• • •	•••	•••		•••		10	10.0	$3 \cdot 1$
	•••	•••	•••		••• ,		9	7.2	$6 \cdot 1$
Nabawa	•••	•••	•••		•••			1.7	13.8
Turvey	•••	•••	• • •		•••			2.4	9.2

These figures taken in conjunction with the percentage of points scored by the principal varieties afford further interesting data. The following table gives these details for 1928 and 1929:—

PERCENTAGE of Points Scored.

			} 5	199	28.	199	29.
	Variety.			Percentage of Times Entered.	Percentage of Points Scored.	Percentage of Times Entered.	Percentage of Points Scored.
Canberra	•••			14.8	6-1	6.1	7
Waratah	•••	•••		46.8	66.0	42.3	32.4
Federation	•••	•••		10.0	6.1	3.1	5.5
Bena		•••		7.2	1.5	6.1	7.4
Nabawa	•••	•••		1.7	4.6	13.8	20.4
Turvey		•••		2.4	1.5	9.2	12.9

The most noticeable facts shown by these tables are the decline in popular favour of Canberra since 1925, the popularity and success of Waratah since 1924, and the introduction and success of Nabawa from 1928.

## Cultural Methods.

The number of crops grown on fallowed and stubble land in each competition and the average number of times the fallow was worked in each locality in 1929 are shown in the following table:—

AVERAGE Number of Fallow Workings.

Locali	ty.		Number of Crops Exhibited.	Crops on Fallow.	Crops on Stubble.	Average Number of Times Fallow Worked.*
Forbes Parkes Trundle Bogan Gate Condobolin Manildra Nelungaloo Tichborne Gunning Gap		***	 7 8 5 12 11 6 7 6 3	7 8 5 12 9 6 7 6	  2  	3·4 4·9 2·4 4·0 2·6 4·8 4·9 4·5 4·0

<sup>\*</sup> The ploughing, or initial working of the ground, and the sowing, if done with a seed drill, have not been included in the number of workings. Where the combined drill was used it has been counted as a working.

The number of times the fallows were worked is considerably less for 1929 than 1928, due to the exceptionally low rainfall and the few opportunities presented for cultivation.

The only disease of material importance this year was flag smut, and some very heavy infections came under notice. The feeding-off of susceptible varieties appeared to increase infection, though further confirmation of such observation is advisable. A very noticeable occurrence was the heavy infection of the late stools, such stools being promoted by the feeding-off and the mid-August rains. Nabawa again proved to be free of the disease.

Bunt was entirely absent from all crops, while only traces of foot-rot and take-all were observed. Loose smut was only seen as light infections.

## Dubbo and Adjacent Districts.

B. M ARTHUR, H.D.A., Senior Agricultural Instructor.

This portion of the western district has been subject to a run of three consecutive years of unfavourable seasonal conditions for wheat-growing, generally affecting most centres (though grasshoppers were largely responsible for poor yields in many localities during 1928), and culminating in a year almost comparable to 1902 in the sparseness of the rainfall, especially during the sowing period. Yet in spite of these disadvantages the five leading P. A. and H. associations, namely, Cumnock, Dubbo, Gilgandra, Narromine, and Wellington were again able to conduct local crop competitions, and the district was able to provide the winners of the first and third prizes in the Western Districts Championship Competition promoted by the Royal Agricultural Society in the person of Messrs. (N. II. Hubbard, "The Wilgas," Wongarbon, Dubbo, and W. Burrell, "Woodside," Gilgandra.

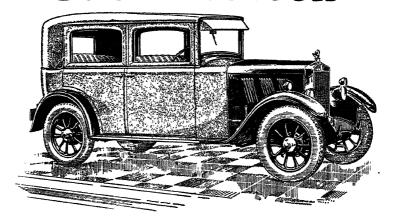
The entries were not large, totalling forty-nine, of which forty-three were submitted for the judge's inspection. This is the smallest entry for several years, but large entries could not be expected in a season such as the one just experienced, and associations did well to obtain sufficient to keep the movement going and maintain interest.

The average yield of all competitor's crops was estimated to be 18.2 bushels, while the highest yield was computed at 35 bushels per acre.

## The Season.

After fair average rains during July, 1928, which enabled those starting early to make a fair job of the initial plowing, or working, the rainfall during the next six months did not exceed 3 inches in any locality, and the falls that did occur hardly warranted the ground being worked nor allowed much further ploughing to be done. This long dry spell was also accompanied by several very windy days, and by abnormally hot summer weather during January, 1929, with the temperature on many.

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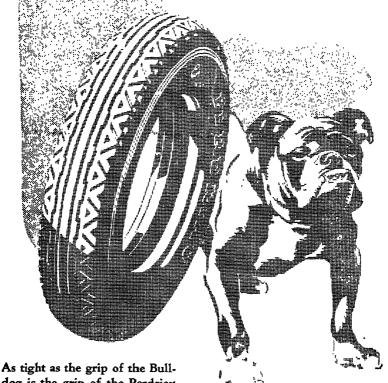
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days over 100 deg. Fah. These conditions did not permit of many opportunities to conserve, or retain soil moisture, and fallows were nearly dried out by the end of January.

Fortunately heavy thunderstorms, of a variable and patchy nature, occurred on several occasions during February, and aggregated 2 to 5 inches or more. This allowed fallows to be worked; and further rains during March and early April enabled a fair seed-bed to be created by those who took immediate steps to make use of this opportunity to give their areas necessary workings.

Those farmers who sowed early after the Easter rains reaped the benefit of a good germination, but those who delayed, or were not ready, found conditions extremely dry during the balance of April and all through May, with a consequent patchy germination, especially on the heavy Wellington, Cumnock, and Narromine soils.

A light, soaking fall early in June mended things somewhat, but another long dry spell until August tested out the crops thoroughly, and spelled the failure of many, as stock had, in the interim, been turned in to feed them off.

Good rains during August caused a wonderful recovery in many crops not too far gone, and further useful, though light, rains during September and October ensured at least some return off those areas where the germination was at all satisfactory. Hail was responsible for losses in some centres during October, and the late rains caused much secondary, or green growth to appear, thus unduly delaying harvesting operations.

Green grains have affected the sample at times, but otherwise the grain is fairly well filled, and of good colour.

The rainfall for the fallow and growing periods at various centres was as follows:—

RAINFALL Table.

					Cumnock.	Gilgandra.	Dubbo.	Narromine.	Wellington
					Points.	Points.	Points.	Points.	Points.
Fallowing 1 March, Growing Per	1929	).	1928,	to	902	898	957	831	884
1929.									
April		•••	•••		78	185	130	88	109
May	•••	•••		•••	82	12	34	36	16
June					81	83	64	35	81 .
July					28	54	88	70	73
August		•••	•••		156	114	115	138	100
Septembe	r	•••	•••	•••	64	132	96	80	119
October		•••	•••		133	96	193	118	155
		Total	•••	•••	622	676	720	599	663
$\mathbf{Gr}$	and !	[otal		,	1,524	1,574	1,677	1,396	1,547

## Cultural Details.

Thirty-nine out of the forty-three entries were sown on fallowed land, the preparation of which was commenced on dates varying from February, 1928, to October of that year, with the greater number commencing during June, July, and August. Disc ploughs or sundercuts were largely preferred to mouldboards, the proportion being 26 to 16. One was prepared with a rigid-tined cultivator. This implement is now being used in this portion of the west with great success, and its use must become more extensive, as it can be worked to a uniform and shallow depth, and at the same time deals effectively with weeds.

Cultivations were mostly given with springtooth implements, combines, or harrows, but the disc implements are still used far too frequently approaching seeding time, with consequent ill-effect on the seed-hed and condition of the surface soil on many soils.

The following table shows the average number of workings given in comparison with past local competitions. Where the crop was sown with a combine it has been counted as a working.

<b>.</b>				Number of	Average Number of Fallow Workings.			
ı	istrict.		1	Crops Exhibited.	1929.	1928.	1927.	
Cumnock		•••		6	4.0	4.8	3.2	
Dubbo		•••		11	4.9	6.6	5.8	
Gilgandra		•••		11	2.3	4.6	4.3	
Narromine	•••	•••		6	3.2	$6 \cdot 2$	ភ.ភ	
Wellington	•••	•••	•••	9	4.0	5-8	2.5	
				43	3.7	5.5	4.2	

AVERAGE Number of Fallow Workings.

Taking into consideration the fact that opportunities for working fallows were very limited during this past season, the number of cultivations given is well up to the average of other years, and points to the fact that enlightened farmers are recognising the necessity of grasping every opportunity to cultivate their fallows in order to conserve moisture, keep down weeds, and assist in necessary soil consolidation.

Thirty-nine of the crops were sown with combines and only four with seed drills, showing how much the combine is in favour with farmers.

## Time and Rate of Seeding.

All competition crops were early sown, once again demonstrating the fact that early sowing is best. This year was exceptional, in that the rainfall during the sowing period was much below average. The dry conditions could not have been anticipated, or greatly increased areas would

have been put in after the soaking, early-April rains. A farmer's operations, in spite of the best of up-to-date methods, are still somewhat of a gamble, and it is very easy to "back the wrong horse."

The quantity of seed used has fallen off this year at Gilgandra and Narromine, but the other districts have maintained an average of about 1 bushel as heretofore. Rate of seeding tests during the past two years have favoured the lower rates of seeding below a bushel, but with a return to better seasons a heavier amount of seed will probably pay best, and it is also in keeping with the trend of modern practices—although grading, and dry treatment of the seed both tend to increase germination results.

The following table shows the time of sowing and the average amounts of seed sown.

	District.		)	Ionth Crop Sowi	1.	_ Amount of
-	District.		April.	May.	June.	Seed per Acre.
Cumnock Dubbo Gulgandra Narromine Wellington		 	3 9 8 4 8	3 1 3 2 1	1	1b. 60 58 50 50 60.5

AVERAGE Amount of Seed Sown.

All crops except four were treated with dry copper carbonate. Two crops were untreated, and two were treated with formalin. Only slight traces of stinking smut were seen, and these were in untreated or formalin-treated crops.

Varieties of Wheat Used.

'The varieties placed in each of the Competitions were as follows:—

- District.	First Place.	First Place.			Second Place.			
Gilgandra Narromine	Yandilla King Nabawa Nabawa Marshall's No. 3 Nabawa	•••	Turvey Waratah Bena Turvey Turvey			Nabawa. Bena. Turvey. Bena, Bobin, Turvey. Yandilla King.		

Nabawa did best with three wins and one third; Yandilla King obtained one first and one third, while Turvey was consistent by being represented in three seconds and two thirds.

Only eleven varieties were shown, and Turvey, Nabawa and Waratah were the most popular in that order, with eleven, ten and eight exhibits respectively.

The slower wheats showed out to best advantage this season, a late spring rains favoured them more than earlier maturers. Of the eleven varieties exhibited, six were slow growers, three mid-season, and quick maturers.

## Fertilisers.

Out of the forty-three crops judged only five (two each at Gilgandra) and Narromine and one at Wellington) were not manured with superphosphate. The average amounts used at the various centres were:—Cumnock, 56 lb.; Dubbo, 65 lb.; Gilgandra, 46 lb.; Narromine; 50 lb.; Wellington, 54 lb.

The quantities were slightly less than in the previous two years, but this was largely due to economic considerations of cost during hard times.

## Diseases.

Flag smut is the only disease of any serious consequence in the greater portion of this western district, and where it is causing any serious economic loss farmers are taking steps to combat it by sowing certain varieties which show a high degree of resistance to it under field conditions, such as: Nabawa, Wandilla, Riverina, Exquisite, Bunyip and Florence, and to a lesser extent Yandilla King and Bobin. Susceptible varieties such as Canberra, Waratah, Hard Federation, Turvey, etc., are gradually being replaced. This disease was fairly prevalent in some places this year, the dry sowing conditions no doubt being largely responsible.

Take-all and foot-rot were rather in evidence in the Cumnock district, and do a certain amount of damage there every year. Fortunately they have not spread to other parts of the west so far.

Stem rust developed quickly in all late-grown or secondary growth, but the majority of the crops were too forward to be injured to any extent. Frost was again responsible for some damage to crops at Cumnock and Gilgandra in the flowering stage.

## Central-western District.

W. D. KERLE, H.D.A., Senior Agricultural Instructor.

Despite the extremely adverse season experienced throughout the Central-western District, the seven agricultural associations which have conducted competitions for the past five years again competed, while Cudal P. and A. Association made its initial effort. The total number of entries was eighty-eight, which, under the circumstances was excellent, and indicates the value which wheat-growers themselves place on these competitions.

The following associations conducted competitions:-

						F	Intries.
Cowra P. A. As		en Compe	tition	•••	•••		11
**		der 640 a					7
, ,,	,, Fal	low and (	Crop Co	ompetit	ion		3
*Grenfell P. A.		•••	•••		•••	•••	13
Eugowra P. an	d A. Associatio	n	•••	• • • •	•••	•••	12
Molong	,,	•••	•••	•••	•••	•••	8
Cudal	,,	•••	•••	•••	•••	•••	11
Canowindra	_ ,,		•••	•••	•••	•••	7
*Ooma Agricult	ural Bureau	• •••		•••	•••	•••	11
Cranbury Agric	cultural Bureau	ı	•••	•••	•••	•••	5
	Total						88

<sup>\*</sup>Grenfell and Ooma competitions were judged by Mr. R. N. Medley, Cowra Experimental Earm.

## Rainfall.

The rainfall for the fallow period (1st August, 1928, to 31st March, 1929) and the effective growing period (1st April to 31st October) on the holdings of the competitors who secured first place in each competition was as follows:—

### RAINFALL.

Mont	h.	F. C. Rowlands and Sons.	F. L. Corke and Son.	Cano- windra, S. Nash.	Eugowra, O'Neil and Bowen	Cudal and Cranbury, H. Balcombe.	Molong, Bradley Bros.	Grenfell Post Office.
						<u>'</u>		1
1928.		Points.	Points.	Points.	Points.	Points.	Points.	Points.
August		. 78	75	68	77	98	35	88
Claus & a 1. a		118	39	36	58	74	27	72
O-1-1		257	137	141	222	200	152	116
November .		105	103	74	122	81	78	110
December 1929.	•••	45	8	0	16	. 10	0	6
Tonnon		21	0	25	0	39	0	9
To have a new	•••	194	352	256	374	232	185	173
Monah	•••	907	292	248	275	286	211	255
Total on Fa	llow	1,025	1,006	848	1,144	1,020	688	829
April		494	85	70	68	51	64	141
7M****		70	40	50	85	92	98	62
Tuesa	<b>.</b>	010	155	140	60	175	86	126
T1	··• ··	7.0	11	25	ő	31	18	15
A	··· ··	100	204	196	215	177	127	183
Comtombon		00	85	103	92	124	90	91
October		100	69	33	47	73	86	65
Total or	Crop	1,144	649	617	567	723	569	683

The season was the worst ever recorded in the Central-west—the rainfall for both the fallow and growing period of the wheat crop being the lowest on record.

It was with difficulty that the initial ploughing of the fallow was done early or properly, and the absence of spring and early summer rains made fallow working almost impossible. February and March rains were good, but very patchy, and enabled the fallow to be brought into fair condition; they enabled some consolidation of the subsurface soil to be effected, which up to this time had been impossible. The seeding rains were light, and only where the late summer rains were properly conserved was a complete germination secured. Generally speaking, the germination was quite satisfactory, and, if on the thin side, was advisable in view of the dry season which followed.

The extraordinary light winter rains followed by a dry spring up to the end of October were responsible for short, poorly-stooled crops generally. The wheat headed remarkably well under the circumstances, and assisted by rain in early November filled wonderfully well indeed.

At the end of October a heavy frost was experienced, which did considerable damage throughout the district, and in the Cudal section hail did considerable damage to crops nearly ready for the header.

The dry conditions were particularly severe on pastures, and farmers were forced to feed off hard their growing crops, which adversely affected the yields to a considerable extent.

As flag smut and foot-rot were rather prevalent also, the wheat-grower had a host of adverse conditions with which to contend this season. and under the circumstances the crops were remarkably good.

The Winning Blocks.

The following were the points awarded the winning entries:-

Association.	Name.	Varieties.	Trueness to Type.	Freedom from Disease.	Evenness.	Condition.	Cleanliness.	Yield.	Total.
Cowra (Open Competition.) Cowra (640 acree Competitiom.) Grenfell Eugowra Cudal & Cran- bury. Molong Canowindra	Bradley Bros	Waratah & Nabawa Yandilla King Waratah	19½ 19½ 19 19 20 20 20 20	27½ 28½ 28½ 28½ 28½ 28 29 27½ 29	19½ 16 18½ 18½ 18 17½ 17½ 18½	91 81 9 8 8 8 8	281 291 29 27 291 281 27 261	35 26 28 29 30 22 25	139¼ 127 132 130 138¼ 125¾ 126

### Cultural Methods of Winners.

- W. J. McCaffrey and T. G. Sloane (Grenfell).—The winning block in Grenfell competition was situated on a medium red loam soil. It was disc-ploughed 5 to 6 inches deep in July, disc-cultivated in January, harrowed February, and combine-sown with Yandilla King mid-April, using 65 lb. copper carbonate treated seed and 65 lb. superphosphate. Points were lost chiefly for foot-rot and take-all, impurities, and weed growth. The prospective yield was 28 bushels, and the crop a very well grown one for the season.
- A. Waugh (Ooma).—The Ooma Agricultural Bureau conducts this competition annually for a cup presented by Mr. G. Simpson, Grenfell. The winning crop was of Marshall's No. 3, sown 4th May on August-September fallow, which had been springtoothed and harrowed in November and again prior to drill sowing, with 60 lb. graded and copper carbonate treated seed with 60 lb. superphosphate. This was a particularly pure block, but lost points for weed growth, unevenness and obvious dry weather damage. It was estimated to yield 23 bushels.
- F. C. Rowlands and Sons (Cowra).—This crop won the open competition for the Werribee Cup and the combined Fallow and Crop Competition conducted by the local society. It eventually secured first place in the Royal Agricultural Society's Championship for the Central Slopes Division.

It was sown from 8th to 12th May on an excellent fallow, which had been mouldboard ploughed early in September and harrowed, springtoothed and harrowed February, disc cultivated end of April, drill sown and harrowed. The crop was not fed off. The variety was Waratah, sown at the rate of 66 lb. graded and copper carbonate treated seed with 80 lb. superphosphate per acre. The total rainfall on the growing crop was 7½ inches. It was a wonderful crop for the season, particularly as regards evenness and density. It was very clean, in excellent filling and ripening condition, and well up to pure seed standard. Most points were lost for disease—footrot and flag smut being present. The yield was estimated at 35 bushels per acre.

Messrs. F. C. Rowlands and Sons have a wonderful record in these competitions. In the last five years they have gradually improved their position in the Royal Agricultural Society's Championships, occupying fourth place in 1925, securing the third cup in 1927, second in 1928 and first in 1929. They won the local cup presented by Mr. H. S. Henley twice in succession and three times in all, and with this year's crop secured the first win in the Werribee Cup and annexed the cup presented for a fallow and crop over a three-years' period by the South-western Shows Association. This record is probably not equalled by anyone in the State, and is worthy of the highest praise.

- F. L. B. Corke and Son (Cowra).—The "Under 640 acres" Competition was won with an excellent block of Nabawa, 35 acres, and Waratah, 15 acres. It was sown 17th to 21st May with 55 lb. graded and dry-treated seed and 50 lb. superphosphate. The fallow was mouldboard ploughed August, harrowed February, disc cultivated March and end of April, harrowed in front of the drill and a week after drilling. It was an exceptionally clean, pure and disease-free crop, but variations in soil combined with the dry conditions, affected the evenness and condition of the crop. The anticipated yield was 25 bushels per acre.
- M. D. Bowen and C. O'Neil (Eugowra).—This was an excellent crop of Waratah, sown 15th to 18th May with 60 lb. copper carbonate treated and graded seed and 70 lb. superphosphate. It was not fed off. The fallow was disc ploughed 5 inches deep in September, harrowed November, combined January, harrowed February, combined April and May, and drill sown. This was a particularly well-grown crop for the season; it was somewhat uneven and showed a little weed growth, but was pure, reasonably disease-free, and with a prospective yield approximating ten bags. These competitors won the local competition in 1928 also.
- H. J. Balcombe (Cudal and Cranbury).—The winning entry in Cudal P. and A. Association's first effort was a particularly fine block of Turvey, which was sown third week in April with 65 lb. graded and copper carbonate treated seed and 60 lb. superphosphate. The fallow was mouldboard ploughed in August, combined October, harrowed November and January, combined February, and combine sown. It was not fed off. The growing crop received 6.70 inches of rain. It was outstanding as regards purity and cleanliness, only dropping half a point for both these items. Disease was very little in evidence, and except for some thinness and faulty germination on the rise, was a dense, even crop. The ears were long and well filled, the block promising a 30 bushel return per acre. Mr. Balcombe won the Canowindra Competition in 1927, and with the present crop secured third cup in the Royal Agricultural Society's Championship for the Central Slopes Division and first place in the Cranbury Bureau Competition.
- S. E. Nash (Canowindra).—A very pure block of Waratah sown on August fallow commenced with the mouldboard plough; springtoothed February; combined and harrowed March; rolled to consolidate prior to combine sowing; followed by the harrows. Seeding was at 75 lb. with 70 lb. superphosphate per acre. In addition to its purity it was remarkable for evenness, condition and light disease attack. Its appearance was marred a little by the presence of a few black oats, and some frost damage reduced the yield which was estimated at 25 bushels per acre.

Bradley Bros. (Molong).—This was Turvey sown mid-April with a bushel of dry treated seed and 56 lb. superphosphate. The fallow was mouldboard ploughed in August; combined in February; harrowed March; and combine sown. The rainfall on the crop for the growing period was

only 5.65 inches and the lack of density was inevitable. It was very pure, carrying a little disease and reasonably free of weed growth. It was an even crop in very good ripening condition and promised a 22-bushel yield.

The Varieties.

The following table shows the varieties judged and the number of "placings":—

	Varieties.						Number of Times Placed.			
		/arietie	s.			Entries.	First.	Second.	Third.	
Waratah						29	4 <del>1</del>	41	5	
Nabawa	•••	•••	•••	•••		8	12	1		
Yandilla E		•••	•••	•••		18	1	31	3	
Turvey		•••	•••			131	3	11	4	
Marshall's		•••	•••	•••		51	1	•••	1	
Bena		***	•••	•••		3	•••	•••	•••	
Purple Str	8.70°	•••	•••	***		2	•••	1/2		
Penny	•••			•••		1	•••	•••		
Canberra		•••	•••	•••		1	•••	•••	•••	
Exquisite		•••	•••			1	•••		1/2	
Currawa	•••	•••	•••	•••		1	•••	•••	•••	
Florence	•••	•••	•••	•••		1	***		•••	
Jay's Won	der	•••	•••	•••	•••	1	•••	•••	•••	
Baroota W	onder		•••	•••		1/2	•••	•••	•••	
Nizam	***	•••	•••	•••		1/2	•••		•••	
Hard Fede	ration	•••	•••	•••	•••	1/2	•••		•••	
Numba	***	***	•••	***		1/2	•••	•••	$\frac{1}{2}$	

The number of varieties, seventeen, was the same as in the previous two years. The table shows the continued popularity of Waratah and its continued success in the Central-western competitions. It is interesting to note that 33 per cent. of the varieties judged was Waratah, 20 per cent. Yandilla King, 15 per cent. Turvey, 9 per cent. Nabawa and 6 per cent. Marshall's No. 3. Nabawa has not been so outstanding as in other districts, although it was placed twice out of eight entries. Grenfell had five entries of Nabawa out of thirteen, the best occupying fourth place. Yandilla King and Turvey are both very popular, the latter again producing the higher proportion of wins. The excellent performance of such popular varieties as Waratah, Yandilla King, Nabawa and Turvey under the drought conditions which prevailed this season, is of particular interest and indicates that their popularity is well deserved.

## Rate of Seeding and Superphosphate.

The quantities of seed and superphosphate applied at each centre shows considerable variation as shown by the averages given in the table below. Compared with last year a slight increase in both seed and superphosphate is noticeable. The amount of superphosphate is not high, and the evidence of winning blocks is that it could be substantially increased generally on well-fallowed ground.

RATES of Seed and Superphosphate.

		Gren-	Ties many		wra.	Canow-	Cudal.	Molong.	Ooma	Cran-	
		fell.	Eugow- ra.	Open.	640 ac.	indra.	Cuuai.	molong.	Ooma,	bury.	
Seed per acre		lb. 61·0	lb. 60·3	lb. 61·3	lb. 65∙0	lb. 68·0	lb. 65·0	lb. 58·5	lb. 62·8	lb. 64·0	
Superphosphate acre.	per	66.5	62.0	67.7	69-4	60.0	62-1	57.0	53.2	60-4	

## Trueness to Type and Purity.

The competitions this season were conspicuous by the large proportion of blocks up to pure-seed standard. The following averages were obtained under the heading "Trueness to Type" in the points awarded in the various competitions:—Grenfell, Cowra and Cudal 19, Ooma 18.7, Canowindra and Cranbury 18.5, Eugowra 18.3 and Molong 18 out of a possible 20. In no section have wheat-growing competitions been more conspicuously successful than in encouraging the use of pure seed and the elimination of badly-mixed, poor-type seed. It is almost rare to come across a competitor these days who does not grade or clean his seed or who employs any other method for bunt prevention than the dry copper carbonate process.

## Prevalence of Disease.

The most conspicuous diseases were flag smut and foot-rot. The average points awarded under the heading "Freedom from Disease" for each competition show, however, that they were not present to a very damaging extent. In the Grenfell district flag smut was much worse than the average for the competition shows, owing to five out of thirteen blocks entered being Nabawa. The average points awarded were:—Grenfell 27.4, Eugowra 27.3, Cowra 27.7, Canbury 27.7, Canowindra 26.7, Cudal 27.8, Molong 28.5, Ooma 27.9.

## Fallow Cultivations.

Owing to the low rainfall during the fallow period and the absence of weed growth frequent fallow workings were not possible or advisable. Insufficient rain made it impossible to consolidate the subsurface soil until February and then not sufficiently. The loose condition of the soil was

most noticeable right up to judging time. The number of workings given was from three to five, the harrows and combine being used most. It is noteworthy that four of the winning blocks were sown with the drill. This machine was certainly more reliable for sowing this season when the soil was in a half dry condition and a satisfactory germination somewhat doubtful.

## Yields.

The average yield of all the blocks judged over the whole of the Central Western competitions was 22.9 bushels, though the yields varied from 12 to 35 bushels per acre. The twenty-seven blocks occupying the first three places gave the excellent average of 27.2 bushels per acre. These results, on an average rainfall over the fallow period (August to March) of 9.22 inches and during the effective growing period (April-October) of 6.00 inches, are remarkable and are unmistakable evidence of the effectiveness of the present-day dry-farming methods advocated by the Department. There is no doubt that the general adoption of these methods in this, the driest season on record, prevented a repetition of the disastrous crop-failure years of 1902 and 1919.

## Northern District.

MARK H. REYNOLDS, H.D.A., Senior Agricultural Instructor.

Three field wheat competitions under the Royal Agricultural Society's conditions were conducted in this district last season, viz., Tamworth (by the P. and A. Society), Quirindi (by the P.A. and H. Association) and at Manilla (by the Farmers and Settlers' and the Business Men's Associations). In addition Quirindi Society conducted a 20-acre contest, judged under the same scale of points.

## Seasonal Conditions.

Either just prior to or just after the commencing of cultivation in February, bounteous rains occurred which favoured soils that could quickly take them in and hold them, *i.e.*, soils of the self-mulching type. It is significant that thirty-six of the forty-eight entries were on this class of soil, and in each competition the leading crops were grown on this soil.

Conditions were most unfavourable, with lack of rainfall to enable root development to reach deeply-stored moisture and produce normal growth until August. From then on satisfactory rains were received. Owing to the rapid growth induced on the stunted crops by these late rains, the plants were somewhat rank and more subject to rust. Those crops that came away in April or May mostly escaped rust.

The following table shows the rainfall for the fallow and growing periods at each of the centres:—

RAINFALL.

			Tamworth.	Quirinal.	Manilla.
.928					
July		•••	 395	357	308
August	•••	•••	 16	10	Nil.
September		•••	 30	15	Nil.
October	•••	•••	 111	134	50
November	•••	•••	 155	290	174
December	•••	•••	 124	139	3
929					
January			 189	128	106
February	•••	•••	 450	493	465
March	•••	•••	 60	99	64
April	•••	•••	 170	256	191
May	•••	•••	 36	58	17
June	•••	•••	 108	19	97
July	•	•••	 93	58	40
August	•••	•••	 269	264	250
September	•••	•••	100	64	100
October	•••		 90	127	128
November	•••	•••	169	110	

The bounteous rains of February stood to the crops when the roots made contact, generally after August.

### The Varieties.

The following table shows the number of times each variety exhibited was entered and the average yield at each centre:—

VARIETIES and Average Yield.

Competition.		Entries.		Waratan.		Canberra.		Aussie.	Vondilla	King.		Currawa.		Nabawa.		Wandilla.	Hard	Federation.		Bens.		Major.
		Total	Entries.	Average Yield.	Entries.	Average																
Tamworth		24 13			4		2	81	4	29	8	318	1	34	, 2	82	2	26	2	23		
*Quirindi (50 acres)		5	3	331	•••								•••			ļ	1	27	1	•••	5	26
*Quirindi (20 acres)	•••	_	_	38	1				1	32					•••		1	27	-		-	
		48	17	31	8	29	2	31	5	29	3	31	1	34	2	82	4	26	8	28	5	26

<sup>\*</sup> Other varieties that occurred, each once as part of an entry were :—In the Quirindi contest— Duri, Comeback and Lusch 4; at Manilla—Faun and Gallipoli.

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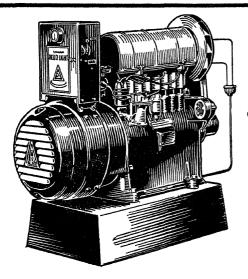
## ENTRIES CLOSE:

<b>EXPORT</b>	BUTTE	R AN	D CF	IEESE		3rd to 12th February.
WINES	• •				• •	4th March.
HORSES	(including	Trottin	g Ever	ıts)		8th March.
CATTLE					• •	10th March.
PIGS						10th March.
<b>POULTR</b>	Y, PIGE	ONS,	CAN	ARIES,	AND	
CAG	E BIRDS	3				11th and 12th March.
DOGS AN	D CATS					13th March.
AGRICU:	LTURE	(inclu	ding	Fruit	and	
Apicı	ılture)		• .			14th March.
DAIRY	PRODUC	E (exc	ept E	xport Cla	asses)	14th March.
WOODCI	HOPPING	CON	ITES.	ΓS		24th March.

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## Comments.

Type and Purity.—At Manilla some entries classed as Major were considerably mixed with two or three other varieties; however, the Waratah especially was very good in this locality.

Evenness.—Owing to the prolonged germination period, from April to August, and the occurrence of second growth, several crops had delayed ripening.

Condition.—In some instances feeding-off bare till August resulted in good crops, but this was aided by the opportune spring rains. Latematuring crops were somewhat rank in growth where spring rains were bounteous, making them more subject to rust, and this reduced the yield.

Diseases.—At Tamworth twenty-one entries were dusted with dry copper carbonate, and sixteen were free of bunt. In one entry each of Waratah, Aussie, Canberra, Riverina and Nabawa, bunt was found, but rarely. At Quirindi all the eight entries treated with copper carbonate were free of bunt, while one treated with bluestone showed bunt rarely.

At Manilla bunt was fairly prevalent in one untreated crop, but with the exception of one crop of Riverina in which a patch of several yards was infested, the crops treated with copper carbonate were free. Loose smut was generally present to a minor extent, though most prevalent in Canberra. Flag smut was present to a light extent in most crops, excepting Nabawa, and to a very slight extent in Wandilla and Currawa, which were usually free. Take-all and foot-rot were a mild infection, the majority of the crops being apparently free. In those early-maturing crops that had turned by mid-October, very slight damage was caused by rust, but the remainder were rusted more or less severely, the outbreak being attributable to the rain and moist weather in mid-October and early November.

FURTHER OPINIONS REGARDING THE "FARMERS' HANDBOOK.''
THE fifth edition of the Farmers' Handbook was published in the latter half
of last year, and has been well received, it being claimed by some reviewers
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## Cabbage and Cauliflower Trials.

BATHURST EXPERIMENT FARM, 1929.

J. A. WILLIAMSON, H.D.A., Experimentalist.

EXPERIMENTS to determine the most suitable varieties of cabbages and cauliflowers to grow in the Bathurst district were again carried out during the past season.

The land on which the trials were conducted is of a granite loam nature, which had previously been cropped with beans and then fallowed from July, 1928, until February, 1929. After ploughing in July, farmyard manure, applied at the rate of 30 tons per acre, was ploughed under in the early spring. The land was cultivated whenever necessary to control weeds and conserve moisture, and was in excellent condition at the time of transplanting in February. The seed was sown in the seed-beds on 8th January, 1929, and a good germination and satisfactory early growth were obtained in each case. The seedlings were transplanted on 18th February, being first dipped in a solution of commercial liquid paraffin emulsion and water to control cabbage moth.

Good rains during the latter part of March were of benefit, but the dry conditions and heavy frosts during the greater part of April checked the growth of all varieties. The mild conditions in May were favourable to the earlier varieties, although the light falls of rain were of little consequence. During June and July the conditions were particularly trying, as, apart from hard frosts, the light falls of rain experienced were generally accompanied by boisterous drying winds. These conditions were serious factors in retarding the growth and maturity of the later varieties. The situation was improved somewhat during the latter part of August, when the milder conditions and fair falls of rain revived the later maturing sorts, but best growth was prevented by the lack of rain during September. The good fallowing, heavy manuring, and careful and judicious inter-cultivation after rains of any consequence were the chief factors in producing successful crops this season.

The rainfall during the growing season, 18th February to 30th September, was as follows:--February 165 points (rain falling on 3 days), March 256 points (5 days), April 163 points (3 days), May 72 points (6 days), June 119 points (6 days), July 34 points (7 days), August 186 points (13 days), Septem er 110 points (6 days); total, 1,10 points (rain fallin days).

## Cauliflowers.

The first cauliflowers were cut on 8th June, Maitland Market and Early Phenomenal being the earliest, as in previous trials. The results from fifty plant rows are given hereunder:—

RESULTS of Cauliflower Trial.

Variety.	First Date Harvested.	Percentage Harvested.	Size.
Early—			
Maitland Market	8 June	92	Medium.
Early Phenomenal		92	Medium.
Four Months Special Giant		84	Medium.
Early Snowball		70	Small.
Early Snowwhite		84	Medium.
Early Greenleaf		22	Small, inferior.
Four Months Strain		74	Medium to small.
Clarendon Early Mammoth	2 ,,	68	Medium.
Late—			
Six Months Departmental Selection.	21 Aug.	90	Large to medium.
Six Months Special Giant	1 Sept.	92	Large.
Phenomenal Maincrop	6	92	Large.
Five Months Strain	9 ,,	72	Fairly large.
Six Months Strain		58	Fairly large.
Five Months Special Giant	16 ,,	68	Large to medium.
Late Metropole	3 Oct.	72	Medium.

Maitland Market was the best early cauliflower this past season, followed by Early Phenomenal, Early Snowwhite, and the four month strain of Special Giant in the order named. The remaining early cauliflowers, viz., Early Snowball, Clarendon Early Mammoth, and Early Greenleaf, were much inferior to the first named varieties in evenness of maturity, size, and quality. The most unsatisfactory early cauliflower was Early Greenleaf, the marketable plants of which were an inferior small type, the majority forming aborted heads.

Maitland Market has proved the best early cauliflower under test to date, and is it intended to take this variety as the standard early variety at this centre.

The best late cauliflower was a strain of the Six Months Special Gians, which was followed by Phenomenal Maincrop and the Departmental strain of Six Months Special Giant. The first two varieties mentioned had better covered and protected heads than the Departmental strain, which was rather unsatisfactory in this respect.

The Six Months Special Giant has proved the most satisfactory main crop variety in tests at this centre, and is well worthy of adoption as the standard main crop variety.

## Cabbages.

The first cabbages were cut on 8th June, the varieties Golden Acre and Enkhuizen Glory being the first to mature, followed by a local strain of Succession. The results are tabulated hereunder:—

RESULTS of Cabbage Trial.

10.7002.5 01			
Varieties.	Date of First Cut.	Percentage Cut.	Weight Per Plot of 100 Plants.
White Brunswick Succession (local strain) Succession (Departmental strain)	16 June 20 ,, 18 ,, 18 ,, 20 ,,	66 88 94	1b. 315 155 340 410 190
Danish Ballhead	15 ,, 21 ,, 15 ,,	80	358 280 266
G.11	21 ,,	70	184 215
Enfield Market	18 ,, 18 ,, 18 ,,	00	324 270 170

The best main crop cabbage to date at this centre has proved to be Succession, the local strain this season being far superior to the European strain, while the Departmental strain was somewhat superior to the commercial strain. Succession is of the drumhead type, and the hearts are generally large and firm. The only other promising variety of the drumhead type this season was Early Drumhead, a fairly early, medium-sized variety.

The most satisfactory early variety was Enkhuizen Glory, which is of the Ballhead type. This variety had very solid hearts of medium size, and showed excellent keeping qualities in the field; quite satisfactory hearts were harvested in late September. Danish Ballhead and Clarendon Early Ballhead are of similar type to Enkhuizen Glory, but were not so satisfactory. Winningstadt was considered the best early to mid-season variety after Enkhuizen Glory. It is a medium-sized early variety with a pronounced pointed heart, which is very solid and keeps well in the field. Enfield Market resembled Winningstadt, but was not as satisfactory, while Iacape, also a pointed type, proved a very inferior variety.

## The Citrus Red Scale

(Chrysomphalus aurantii).

PROGRESS REPORT ON FUMIGATION AND SPRAYING EXPERIMENTS.

A R. WOODHILL, B.Sc.Agr., Assistant Entomologist.

Since the introduction of calcium cyanide dust as a fumigant in 1923, a considerable amount of experimental work has been carried out by the Department of Agriculture in connection with this method and some reports on experiments carried out in 1924, 1925, and 1926 have already been published by workers other than the writer.

In these experiments the table in use for many years for the pot method of fumigation (i.e., 1 oz. of potassium cyanide per 175 cubic feet of space under the tent) was used as a basis. In 1924 (\*) it was demonstrated that dosages of calcium cyanide as high as 1 oz. to 62 cubic feet could be applied late in the afternoon or at night without causing any serious injury. In 1925 (\*) an experiment was carried out having a range of dosage varying from approximately 1 oz. per 40 cubic feet to approximately 1 oz. per 300 cubic feet, and the conclusion reached was that 1 oz. per 175 cubic feet and probably lower dosages would give a satisfactory kill. In 1926 (\*) a further series of experiments was carried out and it was stated that 1 oz. per 175 cubic feet gave fairly satisfactory results, ranging from a 98.0 to 98.9 per cent. kill of scale.

The summary here given is based on experiments carried out by the writer during 1927-28-29. These trials were undertaken in order to determine if possible which method and dosage could be relied upon give the most complete kill over a number of years, due attention being paid to the effect on the trees. At least two, and up to four, identical experiments have been carried out each season in various districts, using mainly oranges, but to a lesser extent lemons also. All fumigations, unless otherwise stated, were for a period of forty-five minutes, the dust methods being applied during the daytime and the pot method late in the afternoon or at night. In conjunction with the fumigation work, experiments were also carried out with various spraying oils and with resin soda. The experiments are still in progress, and, while certain facts have been demonstrated, a great deal of experimental work still remains to be done. It is therefore proposed in this article to give only a brief summary of the methods employed and of the results.

## Method of Estimating Results.

Counts of scale insects were made in a number of these experiments, and as a result it has been definitely determined that counts of up to 800 scales for each dosage, made two or three weeks after treatment, do not

give a reliable estimate of the kill obtained, even when a fair sample is taken from all parts of a number of trees. It is evident that no definite conclusions can be drawn from one year's experiments owing to the variaable results obtained. Observations have shown that field inspections of the trees made within two or three months after treatment do not give reliable information as to the kill obtained, except that it is possible to determine when a very poor kill has resulted. On a number of occasions when inspections were made shortly after treatment, a complete kill had apparently taken place, but nevertheless the trees showed scale plentiful the following season, indicating that the kill had not been very satisfactory. In view of this it was found necessary to ascertain a more reliable method for estimating results, and it was decided to allow twelve months to elapse and then to compare the treated with the control trees. During this time any scale which has not been killed will have multiplied and become noticeable. This method was therefore used throughout the experiments.

With regard to the spread of scale from tree to tree, field observations have shown that this is very slow and that the scale occurring the following season on treated trees is the progeny of insects which have not been killed, and has not spread from untreated trees as is often stated.

## SUMMARY OF THE RESULTS.

## (a) Fumigation.

The 1927 Experiments.—Experiments were carried out at Galston, Gosford, Kurrajong, and Castle Hill with calcium cyanide, the dosages varying from 1 oz. per 175 cubic feet to 1 oz. per 110 cubic feet. In several instances a very poor kill of scale resulted from calcium cyanide at 1 oz. per 175 cubic feet, and the best results with this dosage did not approach a 98 per cent, kill. With 1 oz. per 110 cubic feet dosage of dust and 1 to 175 cubic feet dosage of potassium cyanide a fairly satisfactory kill resulted, but nevertheless the trees showed a fairly heavy infestation the following season, indicating that a more complete kill of scale was desirable.

The 1928 Experiments.—During the previous year a form of calcium cyanide powder, somewhat coarser than the fine dust so far used, had been advocated for citrus fumigation, and following the 1927 results these two forms were both used at dosages varying from 1 oz. per 125 cubic feet to 1 oz. per 100 cubic feet, and the pot method at 1 oz. per 175 cubic feet and 1 oz. per 125 cubic feet, at Kurrajong and Leeton.

The results this season in both districts with all dosages of both the fine and the coarse calcium cyanide and with the pot method at 1 oz. per 175 cubic feet were most unsatisfactory, a very poor kill being obtained on all trees. A satisfactory kill, however, resulted from the pot method at 1 oz.

per 125 cubic feet, though even with this dosage the trees showed a light infestation the following season.

During the winter further experiments were carried out at Leeton and Kurrajong with both forms of calcium cyanide at 1 oz. per 100 cubic feet and a fairly satisfactory kill resulted, but nevertheless the trees showed a fairly heavy infestation twelve months later. During November and December a series of experiments with the coarse form of calcium cyanide at 1 oz. per 100 cubic feet was carried out and a very poor kill resulted in every case.

The 1929 Experiments.—It was thought that possibly some factors were operating in 1928 which made scale control by any method more difficult than in other years, and consequently in 1929 the coarse and fine forms of calcium cyanide were again used at Somersby, Kurrajong, and Leeton at 1 oz. per 100 cubic feet and the pot method at 1 oz. per 125 cubic feet. The coarser form again gave a very poor kill while the finer form gave a fair kill, but by no means as complete as could be desired, living scale being readily detected on the trees after treatment. The pot method in one experiment gave apparently a complete kill, as, at the time of writing, the trees are still clean, but in the other experiment the trees developed a light scattering of scale in the summer of 1930.

## Method of Application of Calcium Cyanide Dust.

Several dlifferent types of blowers have been tested, and, while in the 1927 and early 1928 experiments a rotary blower was used which forced a strong blast of dust under the tent and caused a deposit on the leaves, in the late 1928 and 1929 experiments a smaller type of blower was used, the object being to distribute the dust on the ground in a fine state of division, without causing very much of it to rise through the tree. This type of blower became necessary for two reasons: (1) It was found that some damage occurred when the fine type of dust was blown in a strong blast under the tent, and (2) it was found that the coarser form of powder was very readily handled by this blower. The potassium cyanide was used in the usual type of pot generator covered by some form of spreader.

## Effect of Fumigation on the Tree.

No serious injury to the trees resulted from the pot method at 1 oz. per 125 cubic feet, provided the fumigation was not carried out in bright sunlight. In none of the above experiments with calcium cyanide has any serious injury resulted from the dosages used, although a considerable range of temperature and humidity has been encountered, e.g.. 95 deg. Fahr. with 50 per cent. humidity, 55 deg. Fahr. with 90 per cent. humidity, and 70 deg. Fahr. with 75 per cent. humidity. Cases have also been recorded where temperatures of 81 deg. Fahr. and 73 deg. Fahr. have been accompanied by humidities of 70 per cent. and 81 per cent. respectively,

 $[Feb.\ 1,\ 1930.$ 

without any injury resulting. Nevertheless, judging by the slight damage observed in the experiments, injury is more likely to occur when both temperature and humidity are high, particularly when the fine type of dust, which rises readily, is used. The coarser form is definitely safer to use under all conditions. Lemons are very susceptible to fruit injury from a deposit of calcium cyanide dust, and the coarser type of dust which does not rise should always be used for this fruit, except under very dry conditions.

Several cases have been investigated where growers have used a large rotary blower and have placed the nozzle directly against the trunk. This has resulted in a deposit of dust up to half an inch thick on the trunk at ground level which has killed the bark beneath. As well as causing this injury there would be very little chance of a successful kill of scale under these circumstances, as it is essential for the dust to be finely divided, and growers are therefore warned not to allow such an accumulation of dust to take place.

## (b) Spraying.

In 1926 an experiment which included a number of different brands of miscible red oils and resin soda was carried out at Gosford. Two of the brands of red oil were found to give a much better kill than the remainder, and resin soda gave a very poor kill. These results confirmed previous experiments carried out by Mr. W. B. Gurney, Government Entomologist, and Mr. T. McCarthy, Senior Assistant Entomologist.

In 1928 and 1929 experiments with the best of the miscible red oils and different brands of miscible white oils were carried out in various localities.

With regard to the kill obtained this was comparable to that obtained with fine calcium cyanide dust at a dosage of 1 oz. per 100 cubic feet, but was never equivalent to some of the best results obtained in the fumigation experiments, i.e., the pot method at 1 oz. to 125 cubic feet. A slightly better kill was obtained with the white oils than with the red oils. On several occasions a number of motile young were observed to emerge from the parent scales on fruit two to three weeks after these fruits had been completely wetted all over with spray. This applies to both the red and the white oil sprays.

## Effect of Oil Sprays on the Trees.

The miscible red oils sometimes burnt the foliage and fruit to some extent even when perfectly emulsified and applied under cool conditions, whereas the white oils did not cause any damage when applied under hot conditions, and always emulsified readily even with hard water. Reports from abroad indicate, however, that the heavy miscible white oils may cause a more insidious type of damage due to the thick film of oil, which remains on the trees for many months. It is stated that this damage

consists of a reduction in blossoming and a retardation in the colouring of the fruit. Experiments are in progress to determine whether similar effects can occur under our conditions.

## CONCLUSIONS.

## (a) Fumigation.

As a result of these experiments it is evident that the fine form of calcium cyanide used at the rate of 1 oz. per 175 cubic feet is definitely unsatisfactory. Even when the dose is increased to 1 oz. per 100 cubic feet a poor kill sometimes results, and as a general thing the kill is not as complete as could be desired. A further increase in dosage is therefore indicated for this material. With regard to the coarser form, 1 oz. per 100 cubic feet was also found to be definitely unsatisfactory, and a considerable increase in the dosage rate is necessary. The pot method at 1 oz. per 125 cubic feet has given satisfactory results, but the kill of scale is still capable of improvement and a slight increase in dosage is again indicated. Experiments are in progress to determine the amount of these increases and their effect on the trees.

None of the materials or dosages used has consistently given a kill sufficiently complete to keep the majority of the trees clean for two years.

## (b) Spraying.

It has been established that resin soda cannot be relied on to give as satisfactory a control as an oil spray. Of the oil sprays certain brands of miscible red oil have proved superior to others. A comparison of the red miscible oils and the white oils showed that a slightly better kill was obtained with the latter, which also had the advantage of not causing any burning of the leaves or fruit even under adverse conditions. The results from the white oil sprays were comparable to those obtained with the fine form of calcium cyanide at 1 oz. per 100 cubic feet, but the best result obtained by spraying was not equivalent to the best kill obtained by fumigation with the pot method at 1 oz. per 125 cubic feet. It should be pointed out that the trees were sprayed in a more thorough fashion than is usually practised by growers, 8 to 10 gallons being applied to large trees measuring 12 feet by 14 feet.

## New Methods.

During the year 1929 two new fumigants became available and have been tested on several occasions during the winter and will be included in this year's experiments. Though results appear to be promising, no definite statement can be made at the present time with regard to desages or the effect on the trees under varying conditions.

One of these materials consists of an inert porous mineral earth into which pure hydrocyanic acid gas has been absorbed. This material is packed in air-tight canisters and is measured according to the gas content

by means of a special measuring device. The required dosage is thrown under the tent and gives off its gas content with great rapidity on exposure to the air.

The other material consists of a high-grade calcium cyanide compressed into small blocks, each of which has a definite gas content. The gas, however, is not given off until the blocks are ground into a powder. operation is performed by a small machine, operated by hand, which grinds up the blocks and blows the resulting powder under the tent in the one operation.

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- (2) ARTHUR, J. M., and HARRISON, T. H .-1926. Calcium Cyanide Dust for Fumigation of Citrus. Agricultural Gazette. N.S.W., 37: 245.
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## THE EFFECT OF AGE ON THE YIELD AND QUALITY OF MILK.

FROM a study of the records of the variations in production, due to age, of 738 Ayrshire cows for 4,380 lactations, R. R. Kay and Andrew C. McCandlish, of the West of Scotland Agricultural College, reached the following conclusions:-

Milk and butter-fat production increase up to about seven years of age, and then show a decrease.

The fat percentage for 3-year-olds is higher than that of older cows.

After 3 years of age there is little change in the fat percentage with age that is of any practical significance, until advanced ages are reached, when there may be a fall of importance.

The increase in production associated with age is probably attributable, in part, to the growth of the secretory tissue in the udder, and to body growth in general.

Part of the increase may also be due to an improvement in functional activity through use.

The tendency for milk to show a slightly lower fat percentage as the cow advances in age is probably due to the fact that as the milk yield changes. the fat changes in the same direction, but at a slower rate.

There is little known regarding the influence of very advanced age on production, but it is probable that many cows maintain for a long time the production associated with maturity, and then decline slowly.

Heifers with a low fat percentage need not as a rule be expected to test higher on reaching maturity.

It is probable that the increase in production with maturity is associated more closely with high initial production than with persistency of production.

## Kikuyu Grass and Bracken Fern Control.

RESULTS OF A TRIAL IN THE TAREE DISTRICT.

J. N. WHITTET, H.D.A., Agrostologist.

In August, 1926, Mr. H. W. Lee planted kikuyu grass in poor quality, gravelly soil which was badly infested with bracken. The area was ploughed and disc cultivated, and drills struck out 3 feet apart, the cuttings being dropped about 3 feet apart in the drills and covered by turning a light furrow on them. When the plants were showing above ground the area was worked with a tine harrow to level it down.



Fig. 1.—Untreated Pasture, Showing Tangled Growth of Bracken and Other Weeds.

The rainfall for the six months ending December, 1926, was 19.34 inches, of which 5.88 inches fell during July, and 9.86 inches in December, which means that in the intervening four months only 3.60 inches of rain fell. This comparatively light total, occurring during the most critical period of the plant's early growth, fully demonstrates the ability of kikuyu grass to establish itself under dry conditions.

The accompanying photographs were taken two years after the grass was planted. Fig. 1 shows an untreated area infested with bracken fern and other vigorous-growing weeds, while Fig. 2 illustrates the smothering effect that kikuyu grass has on all other plants in the pasture, and its power to convert a waste area into a valuable pasture. The area shown in Fig. 2 is part of the same paddock and adjoins that in Fig. 1.

Mr. Lee considers that brush hooking alone is not a satisfactory method of dealing with the fern, and advocates the use of a plough or disc cultivator wherever it is possible to work implements of this nature. Although the initial cost of preparing the land in this manner may appear to behigh, he contends that the results justify this expenditure. It is not necessary to clear the land of all roots and stumps, but if the logs are burnt off and the majority of the stumps burnt level with the ground, this will be sufficient to start operations.

Disc implements are the best to use as they assist in destroying the fern; on hilly country a hillside disc plough is recommended. All these operations should be performed in the early spring months and the kikuyu grass planted as soon as frosts are over. Large areas of kikuyu grass are now established at the Department's experiment farms in coastal districts, and cuttings are available at very reasonable rates.

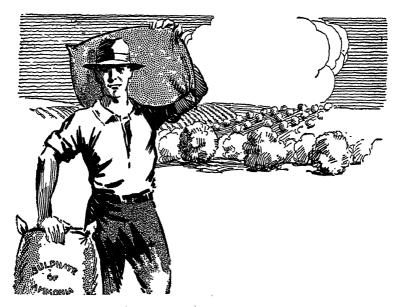


Fig. 2.— Kikuyu Grass has been sown on this Area.

This is another portion of the same paddock as shown in Fig. 1. Note how the cattle keep the growth closely grazed.

This grass provides excellent quality feed, and although mainly a summer grower it withstands dry conditions better, remains greener for a longer period and provides a greater bulk of feed during winter months than does paspalum. Kikuyu is particularly useful for planting on hill-sides, as it binds the soil together and thus prevents washing of the surface soil.

In very cold districts its growth period is limited to a few months of the year, consequently successful results can only be looked for in areas where the rainfall is fairly plentiful, and where a long, warm growth period is possible.



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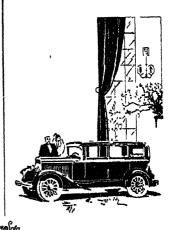
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## The Tung Oil Tree (Aleurites Fordii).

G. P. DARNELL-SMITH, D.Sc., F.I.C., F.C.S., Director of the Botanic Gardens, Sydney.

A NEW book ("China-Mother of Gardens," by E. H. Wilson) has recently been published by the Stratford Company. Mr. Wilson is the keeper of the Arnold Arboretum, of Harvard University, and was collecting plants in China from 1899 to 1911. His remarks published below on the Tung oil tree (Aleurites Fordii) are of interest, and there is no doubt but that efforts should be made to establish this tree in Australia. In America the valuable commercial properties of Tung oil are fully recognised and the tree is being established there in suitable localities.

Seeds from a tree of Aleurites Fordii growing in the Sydney Botanic Gardens have been analysed by Mr. A. R. Penfold, Curator of the Technological Museum, and have yielded oil up to 45 per cent. of the weight of the kernels.

EXTRACT FROM "CHINA-MOTHER OF GARDENS" (E. H. WILSON).

The T'ung yu (Aleurites Fordii) is abundant throughout the Yangtsze Valley from Ichang westward to Chungking; more especially it luxuriates in the region of the gorges and the contiguous hill country up to 2,500 feet altitude. It is essentially a hillside plant, thriving in the most rocky situations and on the poorest of soils, where there is a minimum rainfall of 29 inches; it will also withstand drought and a few degrees of frost. It is a quick-growing tree, seldom exceeding 25 feet in height and averaging less, with a much-branched, flat-topped head, 15 to 30 feet or more through, and is highly ornamental in flower and foliage. The flowers, produced in great profusion during April, are white, stained with pink, and have yellow markings, especially near the corolla base. These are followed by green, apple-like fruits, which ripen in September, and are hidden amongst the large, glossy-green, heart-shaped leaves. Each fruit contains three to five seeds, which somewhat resemble shelled Brazil nuts, but are much smaller. The fruits break naturally in three parts when dead ripe, but they are invariably exthered before this period and collected into heave which are covered with street.

The fruits break naturally in three parts when dead ripe, but they are invariably gathered before this period, and collected into heaps which are covered with straw or grass. Fermentation sets in and quickly disposes of the thin fleshy part of the fruit, after which the seeds are easily removed. The process of extracting the oil is very simple. The seeds are first crushed in a circular trough beneath a heavy stone wheel revolved by horse or ox power. The comminuted mass is then partially roasted in shallow pans, after which it is placed in wooden vats, fitted with wicker bottoms, and thoroughly steamed over boiling water. Next, with the aid of an iron ring and straw, it is made into circular cakes about 18 inches in diameter. These cakes are arranged edgeways in a large press and when full These cakes are arranged edgeways in a large press and, when full, pressure is exerted by driving in one wedge after another, thereby crushing out the brown, somewhat watery and heavy-smelling oil, which falls into a vat below. This T'ung-oil is packed in tubes and bamboo baskets, and is ready for export. The yield is about 40 per cent. by weight of the seeds. The refuse cakes are used on the fields as fertilisers.

T'ung-yu is the chief paint oil throughout the Chinese Empire, being used for all outside woodwork; as a drier it excels linseed oil. The Chinese do not paint, their boats, they oil them, and the myriads of such craft which ply on the Yangtsze and other rivers of China are all coated and the upper works kept waterproof with this oil. The crude oil boiled for an hour becomes a syrupy oil or p'ei-yu, which is used as a varnish for boats and furniture. Boiled for two hours with the addition of certain mineral substances (Tutzu and To-she), a varnish called Kuang-yu is produced which, when applied to silk gauze and pongees, renders them waterproof. Tung-yu is also used as an illuminant and as an ingredient in concrete; mixed with lime and bamboo shavings it is used for caulking boats.

Besides these, and dozens of other legitimate uses, wood oil is also employed as an adulterant in lacquer-varnish. Lamp-black produced by burning this oil or the fruit husks is a most important ingredient in the manufacture of Chinese ink. The trade in Tung oil is very large. From Hankow in 1900 the quantity exported was 330,238 piculs,\* valued at Tls. 2,559,344.† In 1910 the trade had risen to 756,958 piculs, valued at Tls. 6,449,421.

I have given rather full details of this subject on account of its great importance, and because its value is only beginning to be realised by the western The United States Department of Agriculture has introduced manufacturer. Alcurites Fordii into its experimental stations, and expects to establish an industry in the production of T'ung oil somewhere in the United States. It is worthy of the serious attention of countries other than the United States. In South Africa, Australia, Algeria, Morocco, and other places, for instance, this tree would probably thrive, and its experimental culture might with advantage be undertaken by the various departments of agriculture in those British colonies and French protectorates. Of all the varied economic vegetable products of China, the wood oils are pre-eminently of a kind to receive attention, with a view of establishing the industry in colonial possessions.

## AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

Wauchope (T. Suters) ... Mar
Mudgee (O. Wilkins) ... ,
Bowtal (E. Waine) ... ,
Bombala (P. J. Jonas) ... ,
Taralga (W. N. Fitzgibbons) ... ,
Bullahdelah Agricultural Bureau
Wingello (J. E. Creelman) ... ,
Batlow (C. S. Gregory) ... ,
Blayney (W. Ware) ... ,
Young (T. A Tester) ... ,
Kempsey (E. Mitchell) ... ,
Crookwell (A. G. McDonald) ... ,
Campbelltown (E. A. Skidman) ... , Wollongong (W. J. Cochrane) ... Feb. 6, 7, 8.
Tahmoor (A. G. Crook) ... , 7, 8.
Leeton (W. Roseward) ... , 11, 12.
Nowra (H. Rauch) ... , 13, 14, 15.
Milton (F. Cork) ... , 19, 20.
Kangaroo Valley (L. W. Vance) , 21, 22.
Pambula (L. K. Longhurst) ... , 21, 22.
Coonabarabran (Les. Byrne) ... , 25, 26.
Newcastle (P. Leege) ... , 25, 28. Mar. 13, 13 , 13, 17 16, 15. 1, 20. 1, 22. 1, 22. " 41. 22. " 25. 26. " 25. 26. " 26. 27. " 26. 27. " 28. 29. " 27. 28. 29. " 28. 29. " 28. 29. ,, 25, 28, Mar. 1. Newcastle (P. Leegoe) ... 25, 26. 27, 28, 27, 28, Uralla (D. G. Evans) ... Oberon (F. H. Kelly) ... Gunning (G. E. Ardill) ... Crookwell (A. G. McDonald)
Campbelltown (R. A. Sidman)
Gresford (A. R. Brown)...
Dungog (W. H. Green)...
Camden (G. V. Sidman)
Goulburn (Major Harris)
Muswellbrook (R. C. Sawkins)...
Sydney Royal (G. C. Somerville)
Orange (G. L. Williams)...
Grafton (L. C. Lawson)
Young Sheep Show (T. A. Tester) Bobertson (J. K. Hamilton)
Bowraville (A. H. Newman)
Braidwood (R. L. Irwin)
Matiland (M. A. Brown)
Wallamba (E. A Carey)...
Moss Vale (W. Holt) ...
Rydal (H. Murray)
Gundagai (P. J. Sullivan)
Macksville (George Hughes)
Tumbarumba (M. Kinstler)
Nimbin (S. H. Klimister)
Dorrigo (J. H. Skeoch) ... Mar. 1. Apr. to 4. 28, Mar. 1. Mar. 4, 5. \*\*\* " 5, 6. " 5 to 8. ... , 5 to 8. , 6, 7. , 7, 8. , 11, 12. , 11, 12. , 11, 12. , 12, 13. , 12, 13. ... ... July 30, 31, 28, 27, 28, Sept. 2, 3, 066 vrarton (L. C. Lawson)
Young Sheep Show (T. A. Tester)
Waggs (F. H. Croaker)
Junee (G. W. Scrivener)
Hay (Geo. C. McCracken) ... \*\*\* •••

## INFECTIOUS DISEASES REPORTED IN DECEMBER.

THE following outbreaks of the more important infectious disca" reported during the month of December, 1929:-

Anthrax						•
	***	***	***	***	***	7
Blackleg		***	***	***	***	6
Piroplasmosis (tick fev	er)		***	***	***	Nil.
Pleuro-pneumonia conta	agiosa	***	***	***		6
Swine fever					•••	Nil.
Contagious pneumonia		***	***	•••	•••	74177

<sup>-</sup>MAX HENRY, Chief Veterinary Surgeon

<sup>\*</sup>A picul equals 133.3 lb. †The Chinese tael fluctuates with the price of silver; its average value is about 5s.

## Apples and Pears Exported to England.

During the autumn of 1929 the Department of Agriculture forwarded consignments of apples to Manchester, London, and Hull, and pears to London. A full report on those shipments has been prepared by Mr. H. Broadfoot, Special Fruit Instructor, and will be made available shortly in leaflet form. However, in view of the immediate interest in the opening up of new markets for our fruit in England—a shipment of pre-cooled apples and pears will leave Sydney for Hull early in April next—a summary of the main points brought out by Mr. Broadfoot's report on last year's shipments is given hereunder.

In order to obtain further information as to the marketing conditions in England for apples and pears exported from this State, several consignments were despatched by the Department of Agriculture in the autumn of 1929, direct to the ports of Manchester, Hull, and London.

The apples, purchased from the Batlow Packing House and Cool Stores Rural Co-operative Society, Limited, were chiefly special grade, and included the varieties Granny Smith, Jonathan, and King David. Some were sent packed in Australian cases (dumps), some in Canadian cases, and some in half-cases. Some were packed with the fruit enclosed in oiled wrappers, and others with the fruit in ordinary papers, and, in addition, some of the cases sent to London, besides having wood-wool at the top and bottom of the cases, had wood-wool placed between the layers of fruit.

Several varieties of pears were included in the consignment sent to London—some in trays, and some in half-cases, while wood-wool was used in some cases.

Arrangements were made for a commercial officer attached to the staff of Australia House, as well as the agents to whom the consignments were despatched, to report as to the suitability of the fruit sent as regards varieties, packs, wrappings, &c.

## The Apples.

It would appear from these reports that in each apple consignment a small proportion of the larger-sized fruit was case bruised, and the suggestion was made that the cases should be lined with corrugated cardboard. And where lining paper was used it should be so placed that the ends meet in the centre of the top to avoid the untidiness of torn paper.

The Canadian case was preferred to the Australian by all the agents concerned, because it is more attractive, and, having a greater surface area, lends itself more to display, while the slats are an advantage in allowing better ventilation during transit. The Australian case, it was claimed, lacked flexibility, resulting in a greater percentage of bruised fruit, and appears smaller than the Canadian. One agent (Messrs. J. and H. Goodwin, of Manchester) pointed out, however, that the Australian case was not responsible for low returns, provided the fruit it contained was satisfactory, and only recommended the use of the Canadian case if it was not more expensive to the grower.

The half-case was not generally recommended for such varieties as Jonathan and King David, although it was pointed out that it might be adopted with advantage for Cox's Orange Pippin and Gramy Smith, for first grades only. The call for such a package, it was reported, was likely to be restricted to the better class trade, and it was unlikely that it would make any appeal to the trade generally, as the fruit for which the demand was greatest was that which could be retailed at 6d. per lb. This recommendation, of course, chiefly affects the results obtainable at auction, but it was pointed out that high-class, private-treaty salesmen would doubtless prefer to deal to a larger extent in half-bushel cases when the fruit was of high quality.

The use of wood-wool for packing apples individually was not recommended, mainly because it reduced the number of apples in the case, and was not necessary if the fruit was well packed. If packing was considered necessary, the use of corrugated cardboard was recommended.

The cases containing the higher counts met with the greater demand,  $2\frac{1}{2}$ -inch size being the most popular for varieties such as Jonathan and King David. It was pointed out by Mr. G. L. Curtis, Commercial Officer of Australia House, that the recognised sizes of the trade are  $2\frac{1}{4}$  inches,  $2\frac{1}{4}$  inches, and  $2\frac{3}{4}$  inches, and that the sizes  $2\frac{3}{8}$ ,  $2\frac{5}{8}$ , and  $2\frac{7}{8}$  should not be used.

The use of both the size and the count methods of marking the cases led to some confusion, it being pointed out that, as English buyers are used to the count method, it only should be used.

The use of labels of the "Mountain Maid" type was recommended.

## The Pear Consignment.

The varieties of pear sent, viz., Winter Cole, Glou Morceau, Packham's Triumph, Winter Bartlett, Josephine des Malines, Winter Nelis, D'Anjou, L'Inconnue, and Peter Barry were reported as good selling kinds, the last two being less popular than the others. Mr. G. L. Curtis pointed out in his report that the varieties Beurre de Capiaumont, Beurre Bosc, and Howell, which were suitable varieties, were not included.

The use of the half-bushel case was recommended for all pears of 2½-inch size or smaller, and generally for varieties such as Packham's Triumph, Winter Bartlett, Winter Cole, Glou Morceau, Howell, Beurre Bosc, Beurre de Capiaumont, and L'Inconnue. The tray was preferred for selected large fruit.

The appearance of the fruit would have been improved if corrugated cardboard had been used as packing. All fruit should be wrapped in strong tissue paper, and the trays should be lined with plain white paper with small quantities of wood-wool inside the paper at the tops and bottom. Corrugated cardboard is preferable to wood-wool in the half-cases.

Trays and half-cases should be marked with the number of fruit they contain.

## Castration of Pigs.

F. BOSTOCK, Piggery Instructor, Hawkesbury Agricultural College.

THE castration of the male pig is a most important and very necessary operation, which must be attended to both by stud breeders and farmers breeding for commercial purposes. The blocks illustrating this article should enable the inexperienced to gain a clear knowledge of the method of procedure in performing this operation.

Castration is essential not only in that it enables the farmer to control the breeding operations at his piggery without hindrance, but because it has many advantages in so far as the pork and bacon pig is concerned,



Fig. 1.-Knife suitable for Castrating Pigs.



Fig. 2.-Triple-crush Emasculator for Use on Aged Boars.

resulting in the production of a carcase free from sexual odours and flavours in the meat, while the flesh is of a much finer grain and quality. Bacon curers prefer the barrow pig (boars castrated while young) to sow pigs for the manufacture of the best quality bacon.

## When to Castrate.

The best time to castrate is when the pigs are from four to six weeks of age, and while they are still suckling the dam, as at that age there is considerably less shock to the nervous system and the growth of the pig



Fig. 8.—One Method of Holding Young Boars.



Feg. 4.—Another Method, especially recommended in the case of Pigs over three months old.



Fig. 5. Washing the Scretum and Surrounding Parts prior to Operating.

will not be checked. A four to six weeks old pig can be handled conveniently and the testicles are large enough to render their removal quite simple. The older the pig is the greater the shock and risk, and the more-severe the after-effects.

## Treatment of the Animal Prior to Operating.

No animal should be castrated without being properly prepared, hence the following rules should be strictly observed in order to avoid unnecessary trouble and loss:—

- 1. The animal should be starved for at least twelve hours before the operation is to be performed.
- 2. Have all instruments thoroughly clean and disinfected.
- 3. Select a dry, cool day. Castration should not be done during very cold, windy or rainy weather.
- Use a 2 per cent. solution of some carbolic disinfectant, sheep dip, or Condy's fluid.



Fig. 6.—Showing the position of Thumb and Fingers when holding the Testicle just before its Hemoval from the Serotal Sac.

Antiseptic Oils.

Suitable antiseptic oils for use after castration may be made up from the following recipes:—

No. 1.-Mix 1 part of carbolic acid with 10 parts of clive oil.

No. 2.—Dissolve 1 oz. of iodoform in 14 oz. of eucalyptus oil, and when quite clear add 30 oz. of olive oil.

These oils are in every way preferable to kerosene or other bush remedies, not only from a humane point of view, but because they stimulate the healing process and repel flies.

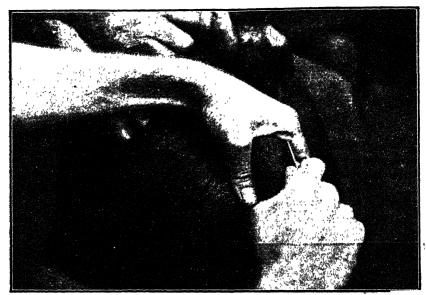


Fig. 7.-Testicle firmly held in the Sac, and Knife in position ready to make the Incision.



Fig. 8.—Gutting through the Thin Tissue before Scraping the Testicle Free.

## The Operation Described in Detail.

The operation is best performed by two persons. Everything should be in readiness before the assistant catches the pig, which should be held firmly on its back to prevent its wriggling about and making it difficult for the operator to work. (See Figs. 3 and 4.) No matter in what position the pig is held it must be held firmly so that the testicles may be handled freely. The next move is to wash the testicles (scrotum or purse) and surrounding parts (see Fig. 5) thoroughly with the disinfectant solution.



Fig. 9.—The Testicle drawn out and the Cord being Scraped.

When all is ready the operator seizes one of the testicles between the thumb and forefinger of the left hand, keeping the remaining three fingers closed (see Fig. 6). An incision is made parallel with the middle line of the body and about half an inch to the side of this line, keeping the cuts low, or in such a position that when the animal stands up the blood, &c., will come away and not collect in the scrotum, as would be the case were the cuts made high (see Fig. 7). The incision should be deep enough to enter the fleshy part of the testicle, thus liberating it from the envelope in which it is normally situated, and long enough to free the testicle and allow free drainage. Care should be taken to see that the cuts are not made too close, or across the middle line of the body, or off the surface of the scrotal sac, as this may result in excessive bleeding and soreness.



Fig. 10.-Using the Emasculator as in the case of a Well-grown Boar.



Fig. 11.—The Operation Completed.

## To Guard Against Bleeding and Rupture.

The testicle is now drawn out and the thin tissue immediately under the testicle cut through (see Fig. 8); after which the testicle, in being drawn away, is scraped (not cut) free from its remaining attachments (see Fig. 9). The cord should never be cut off abruptly, except when the emasculator is used (see Fig. 10), as to do so may cause severe bleeding. Jerking out the testicle is also dangerous, as it may result in rupture.

The first testicle having been removed, the second one is also taken out in similar manner, but through a second incision made for that particular purpose.



Fig. 12.-Abscessed Areas-The Result of Improper Castration.

### After-treatment and Care.

After the operation, antiseptic oil should be poured into the wounds, and the pig placed in a clean, dry pen.

Complications following proper castration are rare, but when the work is not properly done, or the parts not washed, or where the instruments are not clean, abscess formation is common. Should this occur the abscess should be opened with a clean and properly disinfected knife, the wound syringed out with a warm disinfectant solution, taking care not to use too much pressure. When found necessary, wash the wound twice daily until properly healed, using liberal applications of antiseptic oil each time (see Fig. 12).

## Castration of a Ruptured Animal.

The castration of a ruptured pig is a much more difficult operation than that of a normal animal, and must be performed by the "covered" method. This consists of cutting through the skin of the scrotum alone, the testicle and its covering envelope being taken out in one mass and drawn out as far as possible, and the cords at the base of the testicle tied with silk thread, the testicle then being removed by the aid of the emasculator.

After the second testicle has been taken out, three or four stitches should be inserted in the scrotum so as to prevent risk of a further rupture.

In the case of a young pig that is ruptured it would pay better to slaughter the animal and use it as fresh pork. A veterinary surgeon should certainly perform the operation on a mature boar ruptured late in life.

## Acknowledgment.

The writer desires freely to acknowledge the assistance of the officers of the Photographic Branch of the Department of Agriculture and Stock, Brisbane, for their practical services in the preparation of the photographs included in this article.

## NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.

THE Co-operative Bud Selection Society, Ltd., has supplied the following selected Valencia Late orange buds to nurserymen during the 1929 budding season, trees from which should be available for planting during this present year:—

Buds

					Duus.
T. Adamson, Ermington	•••		***		3,100
T. Eyles, Rydalmere	•••			•••	3,500
F. Ferguson and Son, Hurstvil	le.	•••			1,500
R. Hughes, Ermington					1,000
G. McKee, Ermington			***		3,000
L. P. Rosen and Son, Carlingfo	ord	(late of	Epping)		11,400
Swane Bros., Ermington			***		500

-C. G. SAVAGE, Director of Fruit Culture.

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When corn is placed in the silo, that near the surface where it is exposed to the air becomes hot. This has led to a somewhat general belief that the whole mass of silage becomes hot. However, such is not the case, according to experiments by the Bureau of Dairy Industry, U.S.A. Department of Agriculture. Thermometers buried at various places in the silage showed a maximum temperature of 100 degrees Fah., which would be termed only lukewarm. Usually the silage reached its maximum temperature in ten days or less, after which it gradually cooled. It is evident, the Bureau says, that the formation of heat is insufficient to cause sterilisation and thus aid in the preservation of silage. Rather, the silage keeps because of the exclusion of air and the action of the acids.



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## Balanitis in Sheep.

H. G. BELSCHNER, B.V.Sc., District Veterinary Officer (West).

Balanitis, or "pizzle disease," as it is commonly called, is frequently responsible for quite a lot of trouble among wethers, and less frequently among rams. Even if severe mortality does not occur, there is a considerable loss from the unthriftiness of affected sheep. The disease affects the genital organ of the animal, and is not contagious.

## The Cause.

In order to appreciate the chief cause of this condition, it is necessary to consider briefly the anatomy of the parts affected. The urethra, or channel for the urine from the bladder, runs under the skin from the extreme hind part horizontally on the belly in the penis, nearly to the navel, terminating in the processus urethrae (veriform appendix), within the prepuce. The prepuce is a duplicated fold of skin which forms an elongated loose sac covering at the end of the penis. The inside of the sac is lined with mucous membrane studded with sebaceous glands which secrete sebaceous (fatty) material, lubricating the parts.

The urine of sheep is alkaline, that is, it contains a high percentage of mineral salts, which under certain conditions are deposited freely in the bladder in the form of a gritty sediment, or even as urinary calculi. When the urine is voided, this gritty sediment is disseminated around the part at the end of the penis. Some of the gritty matter as it passes over the edge of the prepuce during micturition becomes mixed with the sebaceous secretion from glands, and sets up a great amount of irritation in the preputial sac, which is followed by inflammation and swelling of the parts. The membrane becomes thickened and ulcerated and the sheath is blocked by the increasing amount of sebaceous and urinous material and the decomposing mucous and pus.

This occurs more particularly in wethers, owing to the penis being undeveloped and the formation of the prepuce being held in abeyance due to castration at an early age, necessitating the animal urinating within the sheath during life. In stud animals, the frequent protrusion of the erect and enlarged penis, and the retraction and dilation of the opening of the sheath serve to empty the pouch and prevent any accumulation of sebaceous matter or urine. Young rams cannot protrude the penis until puberty, owing to a frail layer of embryonic tissue which binds the prepuce to the glans penis. This, however, slowly yields as the ram approaches puberty, and the preputial sac opens, after which the penis may be protruded. The very young ram must therefore necessarily urinate in the sheath, which accounts for the disease sometimes occurring in young rams.

It will be noted that in many of the worst cases of this disease in wethers, a small tuft of wool, left at shearing time, is found growing round the aperture. This wool is stained a dark-brown colour, and will frequently be found to have a peculiar gritty feel, noticeable when an attempt is made to shear the part. This collection of stained wool round the already narrowed sheath of the wether, plays a big part in aggravating the trouble. The removal of the long straight hairs growing from the end of the sheath, as sometimes occurs at shearing time, will assist the trouble to develop. These hairs should on no account be clipped, as they serve as a means of draining the aperture, thus relieving it of deposited urine.

Another not infrequent cause of "pizzle disease," is the presence of grass seeds around the prepuce of the animal. The grass seeds work up the sheath, causing abscess formation. The disease occurs, however, quite commonly when grass seeds are not at all troublesome.

If the disease is allowed to run on without treatment, there is a gradual increase of the deposit within the sheath, which causes so much inflammation and swelling (the irritation from grass seeds having a similar effect) that owing to pressure on the end of the penis, the urine is unable to escape, causing much pain. In very bad cases, the pressure from the swelling may stop the circulation of the blood at the part, when the organs will slough; or pressure of the urine due to accumulation may be so great in the urethra as to cause it to burst in some part further back, and so allow the urine to escape. Over-distention of the bladder is likely to occur, and if relief is not given, this organ may burst, followed by rapid death of the animal.

## Symptoms of Balanitis.

The commonest symptoms are restlessness and evidence of pain as shown by the animal striking the belly with the hind legs. The sheep commences to fall away in condition, and, as the disease develops, the animal stands apart from the flock. If the sheep blowfly is active, the animal is liable to become struck around the part.

## Treatment.

If taken in the early stages, the disease may be treated by syringing out the sheath with some weak antiseptic and astringent lotion. The wool, in a circle for two or three inches, should be clipped short, and the prepuce squeezed to remove as much pus as possible. The sheath should then be thoroughly washed both inside and out with a 2 per cent. warm solution of lysol and water (about 2 teaspoons of lysol to 1 pint of water). An ordinary human enema syringe will be found very useful for flushing out the sheath.

After the part has been thoroughly cleaned up, a 2 per cent. solution of copper sulphate (bluestone) should be syringed well into the sheath, and this treatment repeated every three or four days, taking care to squeeze out any pus each time before using the syringe.

Other lotions which might be used with success are boracic acid solution, 5 per cent., or common salt solution 10 per cent. A warm solution of permanganate of potash (Condy's crystals), 1 to 500, is also useful for irrigating the sheath: the solution should be a faint pink colour.

In more advanced and in obstinate cases it will be necessary to slit the opening of the sheath with a sharp knife until the pus can easily come away. To do this properly and to avoid injuring the penis in the operation, two instruments are necessary, namely, a grooved director or probe 5 or 6 inches lour, and a bistoury, or small curved knife. Both may be purchased for a few shillings, and are useful instruments to have on hand. They must be boiled before using. The sheep is placed on its back and the director passed in at the end of the sheath backwards and down as far as it will go. The curved knife is then run down the director as far as possible with its point and back in the groove, after which the point of the knife is raised and run through the skin and the sheath then slit through from top to bottom. Then with a piece of cotton wool or clean rag the pus and accumulated sebaceous and gritty matter may be wiped out and the wound washed with 2 per cent. lysol solution. The part might also be dusted with 1 part of iodiform in 7 parts of boracic powder. The wound must be left open, and treated several times at intervals of a few days.

It is not advisable to adopt the practice of slitting the sheath in all cases of this disease. This procedure should only be carried out when the first treatment outlined has failed, or when the case is already far advanced.

Change of feed, particularly to succulent green food, to keep the bowels and kidneys in good order, will assist greatly in bringing about recovery.

## MYCOTIC DERMATITIS IN SHEEP.

In the April, 1929, issue of the Agricultural Gazette attention was drawn to this disease, which up till that time had not come under notice in this country, probably because of its comparative rarity. During last December, however (according to Mr. Max Henry, Chief Veterinary Surgeon of the Department), the disease was noted in several localities, particularly on the Northern Tablelands.

Mycotic dermatitis is caused by a mould or fungus which gets into the wool follicles and causes a heaping up on the skin of thick, scabby masses which bind the wool together. The back seems to be a favourite situation, as might be expected, remembering that weather conditions play an important part in its development. The very wet nature of last winter, during which the backs of the sheep were kept continually wet over long periods, evidently favoured the development of the disease.

Mycotic dermatitis is infectious, and sheepowners are advised to regard it as such. Treatment of the affected animals is not practicable, as it would entail shearing and repeated dressings; ordinary antiseptic lotions will not penetrate the dense, tough scabs. The most practical plan, seeing that the disease is comparatively rare, is to isolate and fatten off affected sheep.

### TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.			Number tested-	Expiry date of this Certification.
W. McLean, Unanderra			44	1 Jan., 1930
Lunacy Department, Callan Park Mental Hospital	•••		28	5 ,, 1930
Department of Education, Brush Farm, Eastwood	•••		8	5 ,, 1930
E. S. Cameron, Big Plain, Narrandera			39	10 ,, 1930
Lunacy Department, Rydalmere Mental Hospital	•••		68	11 ,, 1930
G. A. Parrish, Jerseyland, Berry			77	12 ,, 1930
Kinross Bros., Minnamurra, Inverell (Guernseys)			73	14 ,, 1930
New England Girls' Grammar School, Armidale			28	16 , 1930
Miss Brennan, Arrankamp, Bowral	•••		14	20 ,, 1930
Kyong School, Moss Vale	***		2	21 ,, 1930
G. Miller, Casula	•••		15	1 Feb., 1930
Queanbeyan Municipality (various owners)			41	1 ,, 1930
St. Joseph's Convent, Reynold-street, Goulburn	•••		5	19 , 1930
St. John's Boys Orphanage, Goulburn		•••	ا ما	19 ,, 1930
St. Michael's Novitiate, Goulburn	***	•••	ì è l	20 , 1930
Department of Education, Yanco Agricultural High S	school		32	23 ,, 1930
Lunacy Department, Kenmore Mental Hospital		•••	81	28 ., 1930
St. Joseph's Girls' Orphanage, Kenmore	***		9	1 Mar., 1930
Tudor House School, Moss Vale	•••	***	1 6 1	6 ,, 1930
Department of Education, Hurlstone Agricultural Hig		ol	ا مد ا	10 April, 1930
Navua Ltd., Grose Wold, via Richmond (Jerseys)		***	1 20	11 ,, 1930
Australian Missionary College, Cooranbong	•••	•••	40	17 ,, 1930
Department of Education, Gosford Farm Homes	•••	***	0.77	24 May, 1980
William Thompson, Masonic School, Baulkham Hills	•••		07	24 ., 1930
F. W. Hopley, Leeton	•••	***	00	29 , 1930
J. F. Chaffey, Glen Innes (Ayrshires)	•••		20	29 , 1930
P. Ubrihien, Corridgeree, Bega	•••	***	110	8 June. 1930
E. P. Perry, Nundorah, Parkville (Guernseys)	•••		00	14 , 1930
Sacred Heart Convent, Bowral	***	***	1 44	17 July 1930
Marion Hill Convent of Mercy, Goulburn	•••	***	40	19 ,, 1930
A. Shaw, Barrington (Milking Shorthorns)	•••	•••		2 Aug., 1930
St. Patrick's College, Goulburn	•••		1	7 ,, 1930
Walter Burke, Bellefaire Stud Farm, Appin (Jerseys)			20	17 , 1980
Mittagong Farm Homes, Mittagong	•••		0.5	30 , 1930
H. W. Burton Bradley, Sherwood Farm, Moorland (J	erseys)		200	4 Sept., 1980
James McCormick, Tumut	***		1 64	5 , 1930
Walaroi College, Orange	•••			19 , 1980
Riverstone Meat Co., Riverstone Meat Works, Rivers	tone		1 444	27 , 1980
J. L. W. Barton, Wallerawang	•••		4.0	9 Oct., 1930
Blessed Chanel's Seminary, Mittagong	***			25 , 1930
N. A. Corderoy, Wyuna Park, Comboyne	•••	***	1 - 4	1 Nov., 1980
S. G. Winkley	•••		1 20	8 ,, 1980
J. Davies, Puen Buen, Scone (Jerseys)	***		1 40	11 , 1930
Lunacy Department, Morisset Mental Hospital	•••		0.7	7 Jan., 1981
			1	1

-Max Henry, Chief Veterinary Surgeon.

### An Increasing Demand for Leaner Pig Products in England.

A GENERAL change is in progress in the prevailing taste. . . A liking for smaller and leaner cuts in place of fat heavy joints was becoming apparent in England in the latter half of the last century. The lean type of bacon and ham, and the small cut of pork, are now firmly established as the predominant requirements throughout the South of England. In the Midlands the demand is for a somewhat fatter product, and for sausages, pork pies, and "processed" meats, whilst further north still fatter products find a ready market.—From Twelfth Report of Imperial Economic Committee: "Pigs and Pig Products."

### The Herd Production Recording Movement in New South Wales.

L. T. MACINNES, Director of Dairying, and J. I. MARROTT, Senior Clerk, Dairy Branch.

### Part I.—The Movement under the Association System.

FOUNDED in 1912 on the far north coast of New South Wales, the movement to increase the average production of milk and butter-fat per cow in the dairy herds of this State is now in its seventeenth year of operation. From 1912 to 1914 good progress was made in the Tweed-Richmond area in organising groups of farmers into herd recording associations for the production recording of their cows, and in 1914, on the outbreak of war, 35,000 cows were being recorded. From 1917 to 1923 herd recording associations were formed in other parts of the coastal area of New South Wales, and operations in these associations were conducted under the direct control of a committee of members who collected fees, appointed the herd recorder, and supervised the general affairs of the association.

It may be realised that under this system no serious control could be exercised over the affairs of the association, and, as the farmers' committees were called together to deal with the affairs of the unit only at intervals, it was found that no effective supervision was exercised over the work of the recorder, who consequently was liable to become indifferent as to the important nature of his duties.

The Department of Agriculture gave aid in the form of a subsidy to all these co-operative associations, and, in addition, the organisation of same was undertaken by Dairy Branch officials. The subsidy given was at the rate of £90 per unit for the first year's operations, and £50 per unit for each succeeding year. Farmers' contributions amounted to £180 per unit.

After the first few years' enthusiasm interest in herd recording waned; this decline was hastened by the lack of proper management of the cooperative units, as conducted by the association committees, each recorder being practically a law to himself. The Department's explicit rules, while observed in the letter, were carried out in an inefficient manner, as disclosed when the Department took over control of the co-operative associations operating in the Tweed-Richmond area in 1923.

Other factors which brought about the decline of co-operative effort were failure on the part of many members to pay outstanding fees, and inaccuracy of the records showing the annual yields of the cows; in many herds the cows were mixed and yields credited to wrong animals.

Statistics are available showing the number of cows recorded each year under the system of association control, and the following table indicates the progress made in New South Wales from 1917 to 1923:—

Year.					(1	ows Recorded.
1917-18						1,400
1918-19	•••	•••	•••	•••	•••	4,500
1919-20						7,500
1920-21	•••	***	•••	•••		10,000
1921-22			•••	•••		8,000
1922-23						6,000

In 1922 the Department called in the duplicate copies of the recorders' figures for inspection in order to satisfy itself as to the authenticity of the milk and butter-fat results as made by the recorders under the control of the associations, and on examination found that many of the results recorded were inaccurate, and could not therefore be of any benefit to the farmer nor of use to the Department for statistical purposes. In one instance the same results of milk and butter-fat were recorded for each cow in the association herds for three months in succession, indicating that very little supervision had been exercised over the work of the recorder.

### Part II.—The Movement under Official Control.

In 1923 the Tweed-Richmond Herd Testing Council notified the Department that it was unable to carry on, the number of cows under record in this area dwindling from 25,000 to under 3,000, and subscriptions from members were in arrears. With the approval of the Herd Testing Council, the Department took over direct control, and in two years increased the number of cows recorded to 12,000, charging the farmers the same recording fee as the Tweed-Richmond Council did, but giving far more efficient service and satisfaction.

Following the exposure of the unsatisfactory methods of herd recording as adopted under the association system, the Department of Agriculture in New South Wales immediately commenced the formation of sub-units (approximately twenty to twenty-five herds) in 1923 under the rules governing its own direct control grade herd recording scheme. These rules provided, among other things, for the appointment of a recorder to each sub-unit by the district senior dairy instructor, who satisfied himself that the appointee was proficient in the work of milk testing before appointment, the checking of all recorders' figures by the Department, issue of statements of production for each cow recorded per month by the recorder, and the issue every six months by the central office of the Dairy Branch of a further statement in tabulated form, indicating the progressive production per cow. In addition, it is necessary for the Department's sub-unit organiser to visit the recorder at the farms and check his accuracy of manipulation and readirg of the fat samples tested.

The subsidy system was continued side by side with that of direct control for two years, that is, until 30th September, 1925, in order to try both out thoroughly. From the experience thus gained, it was definitely decided

to abandon the subsidy system based on association control on and after 30th September, 1925, and from 1st October, 1925, the Department carried on the recording of grade cows in New South Wales under the direct control of its officers. The close supervision exercised over the herd recorders' work, following on the introduction of the new scheme, was found necessary to obtain reliable results, and is the subject of favourable comment by the sub-unit members, who have affirmed that this supervision was conspicuous by its absence in the obsolete method of association recording.

In New South Wales the dairying section of the State is divided into ten districts. Each district is in charge of a senior dairy instructor, who, with a staff of dairy instructors, assistant dairy instructors, herd organisers, relieving recorders, and herd recorders, is charged with the responsibility of locally administering the scheme in the district. The organising of the recorders' work, relief of recorders for annual recreation and sick leave, together with full power to appoint or dismiss recorders, are under his (the senior officer's) jurisdiction. The collecting of fees, the checking of recorders' figures, and the tabulating of returns to the farmers have been centralised at the Dairy Branch office in Sydney, and are carried out at a much reduced cost by the installation of modern electrical tabulating and book-keeping machines.

From 1923 to 1929, mainly due to the co-operation of dairy produce factory managers with the Department, all fees have been collected through the factories by deducting the instalments due each month from the members' cream accounts. During the past five years the amount of bad debts representing fees unpaid has been nil. The cost of recording averages 6s. per cow. This is borne in equal proportions of 2s. by the State Government, the Commonwealth Government, and the dairy farmer.

Up to the end of the year 1928 the recording of pure-bred registered herdbook cows for official production yields was carried out by a separate departmental staff at a total cost of about 55s, per record over each cow's official testing period of nine months. Of this amount the owner paid from 10s, to 20s, per record, according to the number of cows annually submitted by him. Beginning from 1st January, 1929, the official and grade schemes were re-organised and the work carried out by one set of officers for the purpose of lowering costs and improving on supervision and control.

These objects have been achieved. The cost of testing pure-bred stud animals for official record has been reduced to 9s. per 273 days record, towards which the owner at present contributes 4s. per record. All registered herd book cows used for stud purposes in herds under official test are being recorded for "official" and "semi-official" production yields. Already the numbers of both privately-owned studs and cows have shown marked increases since the new scheme came fully into effect on 1st October last. It is considered that records will be kept of about 2,000 herd book stud cows during the current recording year, which ends on 30th September, 1930.

With the expansion in the number of pure-bred and grade cows under record it is considered that the overhead costs will be further reduced, and that this can be passed on for the benefit of the herd owners who are, or will be, members of the Department's production recording scheme. It is expected ultimately to bring the farmer's contribution for grade recording down to 1s. 6d. per cow per annum, and that of the stud breeders to 3s. per official record (273 days' lactation period), and 1s. 6d. per annum for each semi-official record.

The increase in the number of cows recorded under the Department's production recording scheme indicates the satisfaction that the scheme has given to the breeders and farmers in New South Wales.

The following table gives the number of cows recorded each year under the grade recording section:—

Year.					C	ows Recorded.
1923-24						9,000
1924-25						12,000
1925-26						26,293
1926-27			•••			25,662
1927-28	•••		•••			43,047
1928-29	•••		•••			69,823
1929-30	•••	•••	•••	•••		120,000*
1020 00	•••		Catimate	•••	•••	120,000

The following statement will show particulars of the cost to the Department and the extent of the work since 1924:—

						Proportion of Cost Borne by-						
	Year.			No. of Cows Recorded.	New South Wales Government.	Farmer.	Common- wealth Government.					
				!		£	£	£				
1924-25		•••			12,000	1,541	1,443					
1925-26		•••			26,293	3,281	3,727					
926-27		•••			25,662	2,581	3,505	2,566				
927-28		•••			43,047	4,371	3,364	4,305				
928-29		•••		!	69,823	7,500*	6,900*	6,900				

<sup>\*</sup>Figures approximate.

### Is Herd Recording Worth While?

In view of the desire of the various governments, producers' organisations, boards of trade, and farmers, for information as to whether the continuation of herd improvement activities is worth while, it is found that for the period 1921 to 1928, during the major portion of which the Department has organised grade herd recording under the present scheme, the output of butter from all New South Wales sources has shown an expansion of 9,000 tons, whilst the number of cows milked for supplies to butter factories has remained stationary at about 600,000. This equals an average increase per cow of about 33.6 lb. over the period 1921 to 1928. The increased output of butter at £180 a ton represents £1,620,000 to be divided among say 16,000 dairy farmers supplying cream to factories, or

about £95 each. The expenditure to the farmer for herd recording, which very materially helped to obtain this return, was £17,695 (on the basis of 2s. per cow recorded).

The objective of those controlling the organised recording scheme in New South Wales is to record in the near future at least 250,000 cows per annum; afterwards to keep on increasing this number until practically the whole of the pure-bred and grade cows in the State are under continual supervision for their yields of milk and butter-fat. When this position is reached it is confidently anticipated there will be shown a marked increase in individual output and the average per cow will be well over 200 lb. butter-fat.

### VALUE OF CHEESE IN THE DIET.

Our consumption of cheese per head is lower than that of any other white people. Yet 1 lb. of well-ripened cheese is equal in food value to  $3\frac{1}{2}$  lb. of lean meat, and the briefest study of comparative costs will show that the cheese is by far the cheaper food. Many people complain that cheese is indigestible; but while the charge may be admitted against an unripened article, it must be said that well-matured cheese is so easily digested that it is specifically recommended by some physicians for dietetic troubles. Moreover, cheese is not so heating to the blood as meat, and is therefore to be recommended, if for this virtue alone, in such a climate as ours. For persons engaged in heavy manual work, such as miners, quarrymen, &c., it is an especially valuable food product.

### PADDOCK FEEDING IS WASTEFUL.

THE cutting of valuable fodder crops and throwing them in the paddocks for the cattle to eat is still a general practice with many farmers. This method is not only wasteful from the point of view of utilising the full nutritive value of the fodders, but is objectionable from another standpoint. Dairymen have no doubt noticed that by adopting this method of feeding their cows, the herd is continually being disturbed by the strong, robust animals with keen appetites who endeavour to obtain more than their share of the feed, with the result that the younger and weaker animals in the herd are deprived of their nourishment.—S. R. Ballard, Dairy Instructor.

THE elements required by the animal for nutrients are practically the same as those required by a plant, but they need to be in a complex state of combination before they are available to an animal as food. The elements comprising the nutritive portion of the food are chiefly protein, carbohydrates, and fat. Plants or fodder crops supply all these, but in order to obtain the best results from dairy stock a balancing of the plant products according to their nutritive content is essential.

### Poultry Notes.

FEBRUARY.

E. HADLINGTON, Poultry Expert.

### Catarrhal Roup.

FEBRUARY is usually the most humid month of the summer, and therefore it is necessary to pay particular attention to the management of the young stock at this time in order to keep them in good health during the rest of the summer.

Many poultry-farmers are apt to regard the young stock of the spring hatching as out of all danger when they reach the age of five or six months, and, consequently, through not being watchful, they sometimes experience trouble during this and next month, due to the conditions under which the birds are kept. For instance, if large numbers of birds of the age indicated, and sometimes the older ones also, are placed in a house, no matter how large, and they crowd together on the perches, or the perches are too close together, an outbreak of catarrhal colds or roup may be the result. Where colony houses are in use it is advisable to make an inspection occasionally at night to see that no crowding is taking place through the birds from one house migrating to another. This should not happen, however, unless they are attracted by some means, such as feeding all in the one place.

Another mistake which is often productive of the ailments referred to is that of leaving the latest-hatched stock in small, bare runs too long, perhaps because of lack of accommodation in the next stages of rearing. This indicates a lack of foresight in hatching more chickens than could be properly accommodated.

The first signs of impending trouble, brought about by any of the causes mentioned, are a paleness about the heads of the birds, particularly in the face under the eyes, which turns a bluish-white colour, while the whole head appears to contract, giving a gaunt expression; the beak becomes elongated, and the comb, instead of being bright, is lacking in vitality and development. The bodies of the birds, too, gradually assume a wasted appearance. Usually before this stage is reached, however, the cold or catarrhal symptoms begin to show. A slight discharge from the nostrils may be noticed, which causes the openings to become clogged with dust, and an offensive odour is apparent. This is the forerunner of catarrhal roup, which is almost certain to develop if the conditions are not altered.

The first step in overcoming the trouble is to relieve any congestion in the houses and give as much range as possible, or if the houses are not well ventilated this should be remedied. If no action is taken when the symptoms described are observed, the disease will develop and extend through the nasal passages to the eyes, which at first show a watery discharge, followed in many cases by a pronounced swelling of one or both eyes. This swelling will usually be found to contain a substance of cheesy consistency.

and often causes necrosis of the eyeball, resulting in loss of sight. A characteristic by which this disease, when affecting the eyes, may be detected in the incipient stages is a matted patch of feathers on the upper part of the wings where the bird wipes its eyes in an endeavour to clear them. As the disease progresses the birds become more emaciated and mope about, or stand with ruffled feathers, looking objects of misery, and many deaths may occur.

### Treatment of Affected Birds.

All birds which have developed this disease, known as catarrhal roup, should be isolated. If any have reached the worst stage described it is best to destroy and burn them, as they seldom respond to treatment. The milder cases should then be treated at least once daily, preferably twice. Probably the simplest method of treatment is to syringe out the nostrils with a solution of baking soda and common salt, using a teaspoonful of soda and half a teaspoonful of salt to a tea-cup of warm water, or a strong solution of permanganate of potash. The syringing can be done by using a machine oilcan with a fine nozzle which will penetrate the opening of the nostrils. The bird's head should be held downwards during the operation so that the liquid and purulent matter will run out of the mouth. The solution cuts away the mucous substance which is essential to effect a cure. This should be followed by injecting into the nostrils a few drops of a mixture consisting of fifteen drops of eucalyptus oil, fifteen drops of oil of thyme, five grains of menthol crystals, and 1 ounce of paraffin oil.

In cases where the eyes are also involved they should be bathed with a strong permanganate of potash solution, and any accumulation of matter should be removed with a swab of cotton wool, followed by injecting a drop or two of the oil preparation.

In feeding the affected birds they should be given only just as much asthey will clear up.

### A Tonic.

It is advisable to give the birds a tonic after an outbreak of colds or roup, and for this purpose there is no better reviver than Douglas mixture, which can be made up very cheaply by anyone. To prepare the mixture dissolve 4 oz. of sulphate of iron and 4 oz. of Epsom salts in a gallon of boiling water, let this cool and then add ½ oz. of dilute sulphuric acid, which is obtainable from chemists in the diluted form. When these ingredients are mixed this forms the "stock," which should be stored in glass or earthenware containers and marked "Poison." If placed in iron or tin vessels the stock solution would soon rust them through, but when mixed with the drinking water it will not rust galvanised vessels. The dosage is two tablespoonsful of the mixture to each gallon of drinking water, and should be given three or four times a week for a month.

This tonic can be used as a pick-me-up for the birds at any time they are not up to the desired state of health, for instance, such as after the moulting senson, or an attack of chicken-pox. To be effective, however, it must be given regularly over a period as indicated.

### Chicken-pox.

The season during which chicken-pox is usually prevalent is again with us, and those who have not already commenced precautionary measures should lose no time in doing so. The measures which have been found effective in greatly minimising the severity of an attack of chicken-pox are to administer sulphur in the morning mash every third day for three weeks, at the rate of an ounce to each fifty half-grown or adult birds; then discontinue the practice for the following three weeks, during which time Epsom salts is given in the drinking water at the rate of an ounce to each gallon every third day. After this the sulphur is reverted to, and each three-weekly period throughout the season in which chicken-pox is likely to be prevalent, the sulphur and salts are given alternately.

Some poultry-farmers hesitate about giving sulphur during cold or rainy weather owing to a fear of the birds catching cold, but as sulphur does not have the same effect on birds as on animals which perspire, it may be given in any weather.

The Epsom salts is best given in the drinking water, although during any continuous rainy weather where birds have access to other water, it would be preferable to give it in the feed. The reason why it should be given in the water rather than in the feed, as a general practice, is because any birds which may be slightly out of health would not eat as much as the healthy birds and therefore do not get the benefit of the salts, whereas the sick birds usually drink more water.

Where dry feeding is adopted the sulphur could be given in a light feed of wet mash at midday, otherwise it would be necessary to have a separate hopper to give the birds a sulphur-treated mash, which, of course, should be available on every third day only during the three weeks in which sulphur is being administered.

Where these precautionary measures are adopted and carried out strictly to the letter, very little trouble will be experienced with chicken-pox.

#### Vaccination.

During the past year research work has been in progress at the Veterinary Research Station, Glenfield, in connection with the use of a vaccine for the prevention of chicken-pox, and experiments are now in progress to test the efficacy of this method. Properly controlled tests with the necessary checks are being carried out on Departmental farms and tests are also being made on a number of commercial farms.

WITH a silo, crops can be grown at the time of the year when they yield their heaviest, and the material can be conserved in its best and most succulent condition until it is needed. The carrying capacity of the farm may therefore be increased in the summer with the confidence that the stock will be kept in good condition during the winter, ready to respond at once to the improvement of the grass in the spring.

### Orchard Notes.

FEBRUARY.

C. G. SAVAGE and H. BROADFOOT.

### Cover Crops.

EARLY this month is the most suitable time for the sowing of cover crops. Although the upkeep of humus in orchard soils is of great importance, very great caution must be exercised in the growing of cover crops, in order that the growth of the fruit trees may not be adversely affected by reason of the cover crops competing with them for soil moisture.

Cover crops should be sown early so that they will make as much growth as possible before being ploughed in. Use a leguminous crop for preference, and avoid straw crops among the trees. Make sure of having the ploughing in of the cover crop completed by the middle of July, regardless of whether it has reached maximum growth or not. This allows the ploughed-under material ample time in which to rot before the spring. If green manuring cannot be practised, then bulky organic matter in some form or other must be applied in order to keep up the supply of humus.

#### Cultivation.

Every attention must be paid to cultural operations, and the land put in the best condition possible, with the idea of conserving moisture, freeing the land of weeds, and in every possible way encouraging blossom bud formation for the coming season.

### Budding.

Budding may be continued throughout this month, provided the sap is flowing freely. Best results can only be had by careful selection of budding wood from proved trees. When young trees have been planted out and require a pollinator, no time should he lost in making adequate provision for cross-pollination. Write to the Department of Agriculture for a leaflet on the subject of cross-pollination in the orchard.

#### Pests.

Codling Moth.—All infested fruit should be picked up regularly and destroyed. This must be done whilst the fruit is actually infested. If the fruit is collected in bags or cases and is allowed to remain until the grubs have escaped, its collection is labour in vain.

Scale Insects of Citrus.—Fumigation can be carried out this month, but caution should be exercised if the trees are out of condition through lack of moisture in the soil, as such trees may easily be damaged by either spraying or fumigation. Fumigation is the only completely satisfactory

way of controlling scale pests of citrus trees. If spraying is practised the work should be carried out on cool days. A pamphlet giving full directions for fumigation is obtainable free from the Department.

Marketing Apples and Pears.

In contributing the following paragraphs on the above subject, Mr. W. W. Cooke, Fruit Instructor in the Goulburn district, remarks that before these "notes" appear in print the marketing of pome fruit will have commenced. Recollections of the difficulties experienced in the 1927-28 season, when record crops were harvested in four of the States of the Commonwealth, will cause anxious moments for many, as the promise of heavy crops of apple and pears in many of the States this season suggests, at least, temporary gluts again this season. To lessen the trouble as far as possible, it is recommended that attention be paid to: (a) Improvement of the pack and the case; (b) the finding of new markets; and (c) the regulation of supplies.

Regarding the first of these suggestions, it is pointed out that whilst some growers as well as packing houses pack their fruit in sound and attractive manner, others are less careful, and consider any old case, and any style of pack good enough. This is not sound business, for what is the good of spending time and money in growing the finest fruit, if it is to arrive at the market in a damaged condition through faulty packing, and in a case that does not "catch the eye" of the buyer? Badly packed lines are hard to sell, and can only be disposed of at reduced prices. Only by careful grading and packing can the best prices be obtained.

In view of the number of acres of young trees coming into bearing, the question of fresh outlets for our fruit is of vital importance. The time is rapidly approaching when New South Wales will have to contribute her share of pome fruit exported to England and Europe, and the sooner growers become familiar with picking and packing for export, the greater chance they will have of making a success of this branch of marketing. Careful handling, grading, and packing are essential, also a knowledge of the right stage of development at which to pick. Whilst over-ripeness is a grave danger, immaturity is equally disastrous. A fairly safe guide is the turning of the ground-colour of the fruit from a dark to a lighter shade of green. Only high-grade fruit should be exported, as the cost of case, paper, packing, freight, &c., is the same for first as for second and third grade fruit.

Those who are contemplating exporting part of their crop this season, are reminded of the direct shipment of apples to Hull in April, per the motor vessel "Port Bowen." Every effort is being made to ensure the success of this shipment. The fruit will be pre-cooled, and an officer of the Department will accompany the shipment, making detailed observations during the voyage and after the fruit is landed in Hull.

The question of fresh outlets in this, as well as other States, also deserves serious consideration. A market exists in various parts of the State for second as well as first grade fruit, but a knowledge of the requirements of

these markets is necessary. A close study of the requirements of each district will often prevent loss. Every town in the State should have its regular supply of fresh fruit, and if this can be obtained direct from packing sheds or individual growers, freight will be saved, Sydney expenses will be avoided, and both producer and consumer will benefit.

Mr. Cooke refers to another successful method open to those whose orchards adjoin the main road—that is, by direct sale to the consumer—quoting the case of one grower who last season disposed of over £800 worth of fruit from a shed erected on the boundary of his orchard. A tempting display in half- and one-bushel cases was to be seen by all who passed, and orders were booked for fruit to be forwarded by rail.

Regarding regulation of supplies, the writer points out that cool stores and packing houses and thorough organisation of the growers in each district can do much to remedy the periodic gluts that occur in most of our markets, followed later in the year by importation of similar fruit from other States.

### Drying of Prunes.

The large increase in the production of this fruit during the past few years and the keener competition make all the more necessary the marketing only of a first-class article, states Mr. G. W. Beverley, Senior Fruit Instructor, Griffith, in introduction to some directions on the subject of prune drying. The fruit should be left on the trees as long as possible so as to develop the maximum sugar content, for then the fruit will assume the dark purple colour of maturity and will dry out with less waste than if picked on the red side. To obtain a product of even maturity it is necessary to allow the prune to drop and to pick up the fruit daily. Very often on the Murrumbidgee Irrigation Areas a strong wind storm will bring down a great deal of the fruit before it is fully ripe, and the grower, not desiring to lose any of his crop, will process and dry the article, but it will not make as good a dried product either in colour or quality as if fully ripe, and such early harvested fruit should be kept separate from that which is dried at a later date.

The fruit should be sorted, if possible, before dipping. If small and large fruit is placed on the same trays it dries out unevenly, the small fruit being dried up while the large fruit is still only half cured. As most growers pick up their fruit each day from under the trees, the sorting into sizes could be easily performed by the use of two tins, and these in turn could be dipped separately and the grades kept apart on the drying ground.\*

Two methods of drying are in vogue, viz., the drying tray and the wirenetting rack, and the latter has come into more general use of late years owing to the lesser costs of handling, the small ½-inch mesh netting being used. One advantage of the tray, however, is that the fruit can be stacked for two or three days if the weather is hot, and if this practice is followed

<sup>\*</sup>Some of the mechanical dippers are provided with a grader which divides the prones into two or three sizes before spreading on the trays. It should not be difficult to improvise a small grader for this purpose.—W. LE GAY BREEFTON, Chief Fruit Instructor.

much of the fermenting and swelling up of the fruit can be avoided, and a better dried article is produced. Just as it is necessary to shade newly dipped grapes from the direct rays of a hot sun, so it is advisable to protect the fresh dipped prune, otherwise in the very hot climates of the areas the juice will almost boil, and numbers of swellen and "frothing" fruit will be found, and this will not make a first-class article. The dip ranges in strength from 1 lb. of caustic soda to 12 gallons of water to 1 lb. in 15 gallons, and if the fruit is specially thin in the skin even a strength of 1 lb. in 20 gallons will suffice.

After the fruit has been stacked for two or three days, it may be put direct into the open if the weather is not too hot; otherwise, provided that trays are available in quantity, a few days longer in the stack will be found an advantage. If the netting rack is used the fruit should be shaded with hessian for a few days. Wire-netting trays are used on some farms, and these have the advantage that they can be stacked in time of rain, with the additional advantage that the fruit is continually drying on both sides at the same time, which will mean a saving in time if the trays are required to harvest other fruits. When the fruit is ready to take off the trays it is usually placed in clean cornsacks and stored until ready for the brine or boiling water dip before packing.

When the fruit is stacked it will be found advantageous to stand the bags on end instead of laying them one on top of another, for if several bags are stacked on each other, by the time they are ready to be given the final dip the lower fruit is generally found to have been compressed into an almost solid block, and the grade often suffers in consequence. Space is often a consideration, but these points are well worth considering.

### THE VALUE PLACED ON RESEARCH BY U.S.A.

What is good enough for the secondary industries should be good enough for the primary industries. According to estimates, the secondary industries in U.S.A., notwithstanding their present efficiency, are spending something like £40,000,000 per annum on research—£14,000,000 through the Government and £26,000,000 through commercial firms.

### COMBATING "EAT LESS MEAT" PROPAGANDA.

Concern is being felt in some quarters because of the prominence that has been given recently to the statements of food specialists advising against the consumption of meat. A writer in a recent issue of *The Farmer and Stockbreeder* (England) urges the livestock interests to unite for the purpose of counteracting the movement. He points out that a reduced demand for meat would not only deal a heavy blow to British and foreign producers, but would indirectly affect the grain-growers of the world, because of the large quantity of grain used, particularly in years of over-production, for the feeding of livestock. Thus the demand for meat is as vital to the grain-grower as to the meat producer.

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1st March, 1930.

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### Farmers' Experiment Plots.

WHEAT AND OAT VARIETY AND MANURIAL TRIALS, 1929.

### Western District (Parkes Centre).

H. BARTLETT, H.D.A., Senior Agricultural Instructor.

EXPERIMENTAL and demonstrational plots with wheat and oats were established in many centres throughout this portion of the western district in 1929, the experiment committees of the various branches of the Agricultural Bureau closely co-operating with the Department. Field days or afternoons were held in all localities, and although spectacular crops were absent, many interesting results were seen, and much useful information was gained during the tours of inspection.

The Season.
The rainfall at the various centres was as follows:—

#### RAINFALL.

	Month.		-	Parkes Average.	Parkes.	Forbes.	Con- dobolin.	Trundle.	Bogan Gate.
1928.				Points.	Points.	Points.	Points.	Points.	Points.
June	•••	•••		237	174	157	85	133	94
July			•••	. 187	275	230	165	165	186
August	•••			187	90	73	37	58	68
September	•••	•••	•••	170	36	37	40	34	49
October	•••	•••		154	152	96	118	91	136
November	•••	•••	•••	142	79	60	57	57	57
December	•••	•••	***	190	2	Nil	11	2	Nil
1929.	•••				_		~-	_	
January				210	10	1	3	34	6
February	•••	•••		142	136	255	102	105	177
March				168	236	247	52	97	126
THE CIT	•••	•••	•••		200			J.	120
Total	on Fallo	w	•••	1,787	1,190	1,160	670	776	899
1929.									
April	•••			146	117	131	85	141	135
Мау		•••		159	64	45	43	58	86
June	•••			237	103	129	. 70	67	94
July	***	•••		187	32	26	40	25	25
August	•••	•••	•••	187	216	189	247	148	148
September	•••	•••		170	119	73	147	82	94
October	•••	•••	•••	154	69	66	125	112	84
Total	Growing	Period	•••	1,240	720	659	757	633	666

The western district appears to have been the least favoured of any portion of the State for the 1929 wheat crop, and to gain a true insight

into the factors that limited crop-growing, a review of seasonal conditions from February, 1928, is necessary.

The flood rains of February, 1928 saturated all soils and subsoils, and the fallows were then placed and maintained in good condition for the 1928 crop. But the stubble land from the 1927 crop, which was to be fallowed for the 1929 crop, produced an exceptionally dense and tall growth of Stinking Love grass (*Eragrostis major*), which seriously depleted the subsoils of moisture. At the time of ploughing—June to August, 1928—subsoils were more or less dry, and at no time from then until the crops were harvested did sufficient rain fall for moisture to percolate to a greater depth than 9 inches. As wheat roots penetrate to a depth of at least 4 feet, the 1929 crop was under a very evident handicap.

It is of interest to compare the rainfall of the past season, as registered at Parkes, with that of previous dry periods. The records show a similarity between the seasons of 1929 and 1919, but neither was as severe as 1902.

RAINFALL at Parkes for Fallow and Crop-growing Periods of Driest Years.

**************************************	Average Rainfall.	1929.	1919.	1914.	1902.
Fallow Period (June previous year—March).	points. 1,787	points. 1,190	points. 1,068	points. 1,419	points. 978
Growing Period (April—October)	1,240	720	840	726	663
lotal	3,027	1,910	1,908	2,145	1,641

The figures are for Parkes only. As rainfall is generally "patchy," particularly during dry periods, the "old timers" who hold the opinion that the crop period of 1929 was more severe than even that of 1902, are probably correct, as far as their own locality is concerned.

The "below-average" rainfall of the fallow period was responsible for the rather low standard of seed-bed, both as regards condition and moisture content. Few and insufficient opportunities were available for fallow working, and compactness and mellowness of mulch were lacking. The subsoil deficiency of moisture amounted to probably the equivalent of 4 inches of rainfall, thus handicapping the better class fallows to the extent of about 12 bushels per acre.

Germinations were generally thin and patchy. A dry, frosty winter retarded stooling and early growth, and by early August most crops had been fed off to delay spindling. Fair rains in August saved the situation, but a dry period then of six weeks told on the less favourably prepared areas, and it was found necessary to give wholly to the stock about one-third of the wheat crop. About an inch of rain at the end of September carried the balance of the crop on to maturity, producing a sound, plump, bright grain, well above the quality which might have been expected.

### The Wheat Variety Trials.

The following farmers co-operated in conducting wheat variety trials:-

M. Westcott, "Wattle Valley," Condobolin.
A. Heinrich, "Mayfield," Ootha.
E. Jones, "Currajong," Trundle.
W. J. Gravolin, "Bosewood," Guagong.
K. Gault, "Lynwood," Trundle.
H. P. McMahon, "Rangi," Tullamore.
H. P. Vincent, "Woodleigh," Albert.
Stanley Bros., "Lansdale," Tottenham.
T. F. Dwyer, "Pleasant View," Bogan Gate.
L. G. Nettelbeck, "Cloverdale," Nelungaloo.
R. Riley, "Bardeen," Goonumbla.
B. Tomkins, "Westnook," Tichborne.
Allen Bros., "Calarie," Forbes.
F. A. Patton, "Pine Hill," Alectown.
J. Townsend, "Willowvale," Parkes.
J. Jelbart, "Penryn," Trewilga.
D. A. Cameron, "Queant," Mandagery.
S. J. Plowman, "Emu Vale," Parkes.
C. McKay, "Delvin," Forbes.

The plots at Guagong. Tullamore, Albert and Tottenham failed. The yield produced in each locality is a fair indication of the type of season experienced, and although conditions were hard throughout the area, the more northern and western places just missed the little extra rain at opportune times which would have made fair crops. It was not unexpected, therefore, that the plots at Guagong (35 miles west of Condobolin), Tullamore, Albert and Tottenham should have failed to produce comparable yields, even though the localities produced some fair crops in places. Elsewhere seasonal conditions were very similar, and although yields were generally low, they were sufficiently high to be of value for comparative purposes.

Condobolin (M. Westcott).—Soil, fairly deep red loam, new land; disc ploughed May, 1928, combined August, harrowed early April, springtoothed April. Sown with drill 24th April; seed 50 lb., superphosphate 60 lb.

Ootha (A. Heinrich).—Soil, red loam; previous crop, wheat 1927; mould-board ploughed September, 1928, disc cultivated April, combined mid-April. Sown with combine 29th April; seed 45 lb., superphosphate 45 lb. Germination good, stooling poor, growth medium, heads small.

Trundle (E. Jones.)—Soil, red loam, slightly gravelly, new land; disc ploughed July, 1928, harrowed April. Sown with combine 7th May; seed 58 lb., superphosphate 60 lb.

Trundle (K. Gault).—Soil, red loam of medium depth, new land; mould-board ploughed July, 1928, harrowed April. Sown with drill on 2nd May; seed 60 lb., superphosphate 60 lb. Germination rather poor, stooling and growth poor.

Bogan Gate (T. F. Dwyer).—Soil, clay loam; previous crop, Sudan grass 1927; disc ploughed May, 1928, harrowed September, springtoothed April. Sown with combine 7th May; seed 60 lb., superphosphate 60 lb.

Nelungaloo (I. G. Nettelbeck).—Soil, red loam; previous crop, wheat 1926; mouldboard ploughed July, 1928, scarified October, harrowed March, scarified March. Sown with combine 25th April; seed 60 lb., superphosphate 60 lb. The germination of Federation was patchy and its yield was not comparable.

Goonumbla (R. Riley).—Soil, red loam; previous crop, wheat 1927; disced 3½ inches deep in June, 1928, springtoothed end of August, harrowed mid-February, springtoothed and harrowed mid-March, and again in mid-April. Sown with combine 18th May and harrowed; seed 60 lb., superphosphate 65 lb. Germination was good, stooling medium, and growth short.

Tichborne (B. Tomkins).—Soil, red loam; previous crop, wheat 1927; disc cultivated March 1928, springtoothed April, disc ploughed September, springtoothed December, January, February and April. Sown with combine 30th May; seed 62 lb., superphosphate 58 lb.

Daroobalgie (Allen Bros.).—Soil, red loam; previous crop, wheat 1927; mouldboard ploughed June, 1928, springtoothed February, and again in late March. Sown with combine 16th May; seed 58 lb., superphosphate 50 lb. A storm in February, 1929, flooded the area for a few hours, and enabled fairly satisfactory yields to be harvested.

Alectown (F. A. Patton).—Soil, red loam 9 inches deep; previous crop, wheat 1927; disc ploughed 4½ inches in July, 1928, combined September and November, harrowed January and February, combined March, combined early April and harrowed. Sown 17th May with combine; seed 60 lb., superphosphate 63 lb. Germination was good, stooling and growth medium.

Parkes (J. Townsend).—Soil, red loam; previous crop, wheat 1927; mouldboard ploughed August, 1928, disc cultivated January, springtoothed April. Sown with combine 11th May and harrowed; seed 60 lb., superphosphate 60 lb.

Trewilga (J. Jelbert).—Soil, red loam; previous crop, wheat 1927; mouldboard ploughed August, 1928, springtoothed November, scarified February, harrowed March. Sown with combine 11th to 16th May; seed 60 lb., superphosphate 56 lb.

Mandagery (D. A. Cameron).—Soil, grey to red loam; previous crops, wheat 1927, Sudan grass 1928; mouldboard ploughed August, 1928, spring-toothed twice in October and sown with Sudan grass, which germinated well; the growth was frequently grazed. The plot was springtoothed early April and again in mid-April. Sown 22nd April with combine; seed 54 lb., superphosphate 70 lb.

Parkes (S. J. Plowman).—Soil, chocolate to black clay loam; previous crop, wheat 1927; disc ploughed June, 1928, disc cultivated early March, springtoothed April. Sown 15th to 25th May with combine; seed 55 lb.,

VIELDS of Wheat Variety Trials.

-	Forbes.	bus. 1b.	:	:	:	:	:	:	:	14 17	14 45		: : :	67 11	:	: 4		:	:	:	:	:	:	:	:	:	:	;	:
	Parkes. (S. J. Plowman.)	bus. Ib.	:	:	ee :	. E	4 43		:: ,	07 4	:	:	:	:	:	:	:	:	: "	•	:	:	:	:	:	33	7. T	:	:
	.Vr9Lebnald	bus. Ib.	:	:	:	:	:	:	:	16.66	16 53	200	:	:	: 90	10 01	95 49	04, 07	:	:	:	:	:	:	:	:	:	:	:
	Trenilga.	bus. 1b.	:	:	:	: C	O 7	000	:	:0	21 0	:	:	: [	er e	:	:	: 0	200					6, 6 7, 7, 7, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9, 9,		:	:	:	:
,	Parkes.	hus. 1b, bus. 1b,	17 54	:	:	15 6	42.5	00 #T	:	:	:	:	:	:	:	:	:	::	#0 01	0# e1	:	:	:	:	:	:	:	:	:
	Alecton n.	bus. Ib.	:	:	:	:	:	:	:	19 40	25 71	70 ET	:	:	:	: 4	17 04		:	20 21	17 20	15 40	:	:	:	:	:	:	:
	Forbes (Allen Bros.)	bus, Ib.	20 50	:	:	18 43	7.	14 04	:	:	:	:	:	:	1.4 4.1	:	:	:	77	#F 61	:	:	:	;	:	:	:	:	:
•	Тісігротив.	bus. Ib.	:	:	:	:	:	:	:	: 61	10 20		: ,	14 40	: 5	21 10	13 19	e z	:	:	:	:	:	:	:	:	:	:	:
	Соопинівіа.	bus. 1b.	15 44	:		14 26	. 61	1Z 13	:	:	:	:	:	•	ZG 11	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Zelungaloo.	bus. Ib.	:	24 4	:	:	:	:	;		10 61		-		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Bogan Gate.	bus. Ib.	12 34	:	:	9 42	::0	#77 S	:	:	:	:	:	:	፧	:	:	:	76 21	:	፥	:	:	:	:	:	:	10 10	:
	Trundle. (K. Goult.)	bus. lb.	10 27	:	10 27	9 17	:6	27.00	:	9 40	:	:	:	;	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Trundle. (E. Jones.)	bus. 1b.	4 30	:	:	0 +	: 3	٥ ٥	:	:	:	:	:	:	:	:	:	:	?? ??	:	:	:	:	:	:	:	:	:	ວ ສາ
	Ootina.	1b. bus. 1b.	2		10 30		<b>0</b> 9	900		:	:	:	:	:	:	:	;	:	:	:	:	:	:	:	:	:	:	:	:
	Condobolin,	hus. lb.	:	:	7 10			5 45	:	:	:	;	:	:	:	:	:	:	× 25	:	:	:	:	:	:		:	:	<b>o</b> æ
	Varioty.		Nabawa	:	Bobin	Bogan	Canberra	Waratan	Giuyas mariy	Cookapoi	regeration		Bredbo	Nizam	Duri	Yandilla King	Callipoli	Duchess	Riverina	Aussie	Penny	Turvey	Pusa	Perfection	Bena	•	Bald Early	Plowman's 212 C.	Gullen

superphosphate 60 lb. The rainfall in this locality was particularly light, hence the low yields.

Forbes (C. McKay).—Soil, black clay loam, self-mulching; previous-crop, wheat 1927; mouldboard ploughed 3½ inches deep in August, 1928, harrowed November, springtooothed April. Sown with combine 6th May and harrowed; seed 60 lb., superphosphate 40 lb. Germination was patchy, stooling fair and growth short; the heads filled remarkably well.

### Pure Seed Wheat Areas.

The following farmers co-operated in establishing pure seed wheat areas:—

F. Attenborough, "Swansey," Alectown.
E. J. Johnson, "Iona," Gunningbland.
L. J. Matthews, "Noorla," Trundle.
D. L. N. Miller, "Glenlossie," Daroobalgie.
W. Scott, "Deloraine," Bogan Gate.
W. Swain, "Riverview," Peak Hill.
E. J. Allen, Gregra.
A. P. Unger, "Stony Hill," Alectown.

Alectown (F. Attenborough).—Soil, red loam 12 inches deep; previous crop, wheat 1927; mouldboard ploughed 3½ inches deep in August, 1928, again in February, harrowed April. Sown with combine 14th May; seed 60 lb., superphosphate 60 lb.

Gunningbland (E. J. Johnson).—Soil, chocolate to black clay loam; previous crop, oats 1926; disc ploughed January, 1928, and again in June; scarified in September and February, combined March and April. Sown with combine 17th May and harrowed; seed 70 lb., superphosphate 86 lb.

Trundle (L. J. Mathews).—Soil, red loam 12 inches deep; previous crop, wheat 1927; disc ploughed June, 1928, combined September, February and early April. Sown 12th April with combine; seed 60 lb. superphosphate 60 lb.

Daroobalgie (D. L. N. Miller).—Soil, chocolate clay loam; previous crop, wheat 1927; disc ploughed 4 inches in June, 1928, combined October, disced February, combined March, harrowed April. Sown 23rd-24th April with combine; seed 60 lb., superphosphate 56 lb. Hard Federation and Canberra showed 90 per cent. infection with flag smut, Waratah and Bena 50 per cent., while Nabawa was clean.

Bogan Gate (W. Scott).—Soil, red loam; previous crop, wheat 1927; disc ploughed June, 1928, harrowed August, springtoothed September, disc cultivated end of February. Sown 30th May, seed 56 lb., superphosphate 56 lb.

Peak Hill (W. Swain).—Soil, chocolate clay loam; previous crop, oats 1927; mouldboard ploughed August, 1928, springtoothed January, disceultivated April. Sown 13th April with drill; seed 60 lb., superphosphate 60 lb.

Gregra (E. J. Allen).—Soil, chocolate loam; previous crop, maize 1928; the maize failed, and the ground was worked up as late fallow. Sown 26th April to 2nd May; seed 66 lb.. superphosphate 66 lb.

Alectown (A. P. Unger).—Soil, chocolate clay loam; previous crop, wheat 1926; mouldboard ploughed August, 1928, springtoothed September, scarified November, February and April. Sown 23rd-26th May with a combine; seed 60 lb., superphosphate 60 lb.

YIELDS of Pure Seed Wheat Areas.

		Alectown. (F. A. Attenborongh.)	Gunningbland.	Trundle. (L. Matthews.)	Daroobalgie.	Bogan Gate.	Peak Hill.	Gregra.	Alectown. (A. P. Unger.)
		bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.
Nabawa		14 00	,	10 58	13 15	14 14	10 00	Dus.ib.	10 21
Joffre	•••	10 10							
Waratah	•••	9 27	30 54	6 51	8 00	12 56	7 00	18 54	9 54
Boonoo	•••	9 16							
Federation	•••		23 58				7 00	12 18	•••
Bobin	•••		33 19						
Canberra			29 53	7 46	3 20		•••		• • • •
Gresley	•••			8 43			•••		***
Caliph	•••			13 54			•••		
Bena			•••		6 00		•••	•••	•••
Hard Federation	m				8 00	•••		11 45	
Yandilla King	•••	•••	•••	•••		15 51	•••	17 19	
Marshall's No.	3	•••		•••			•••	21 40	•••
Turvey	•••			•••		•••		13 06	
Duri	•••			•••		•••	•••	•••	8 38
Petatz Surprise	•••	•••	•••	•••	•••			•••	10 34
			l	<u> </u>			l		l

Outstanding yields were secured at Gunningbland, where a long summer fallow was practised with dark chocolate to light black clay loam self-mulching soil, thus conserving much of the subsoil moisture secured from the February rains of 1928.

### Notes on the Wheat Varieties.

The outstanding variety under trial in the west during 1929 was undoubtedly Nabawa, and it is certain to occupy a prominent place in the bulk sowings of subsequent years. In the wheat variety and pure seed areas the yield has been consistently high—in comparison with other varieties—and in the Championship Crop Competition of the western district, it scored first, second, third and half of fourth positions. It has proved itself flag smut resistant, drought-resistant and productive under adverse conditions, and these characteristics have prompted farmers to purchase all available seed supplies. Even though the variety has so much to commend

it a word of caution may be opportune. The strength of straw appears to be satisfactory, though not as strong as Waratah, and although head development is unusually good, it has not the tendency to till three or four across as have several of our proved and established sorts. Its behaviour in the districts under conditions favourable to mildew and rust has yet to be determined as the past two seasons have been dry ones. Should 1930 be a favourable wheat year, there are several varieties capable of giving maximum yields, perhaps higher than Nabawa, and it is suggested that sowings of Nabawa should be limited to the areas most heavily infested with flag smut until its behaviour under all seasonal conditions has been established.

Bobin.—During the past two seasons Bobin has been attracting attention, and this year in the plots conducted by Mr. E. J. Johnson at Gunning-bland it produced 33 bushels 19 lb. per acre, the highest yield of any experiment plot in the west. It is about the same season as Waratah, though with better head development. As yet, only very light infection of flag smut has been noticed.

Rajah.—For the past three seasons this variety has topped the yields at Ootha; and this year at Nelungaloo it was well in the lead. It is well worthy of further trial.

Duchess.—At Mandagery, Duchess was promising a yield of 13 bags per acre, but all of the plots there were seriously damaged by frost during October. At Alectown and Tichborne its yield was satisfactory, but owing to its apparent weak straw its further trial is not recommended.

Canberra is quickly disappearing from cultivation, as each year its infection with flag smut is so severe as to greatly affect the yield.

Waratah is to receive competition from Nabawa and Bobin, and in alliprobability the area sown to it will soon be lessening.

#### Wheat Manurial Trials.

The following farmers co-operated in conducting wheat manurial trials:-

M. Broderick, "Avondale," Bogan Gate. G. F. Mill, "Hazelmere," Gunningbland. D. L. N. Miller, "Glenlossie," Daroobalgie. G. Tanswell, "Fernleigh," Goonumbla. W. B. Cheney, "Velvedere," Brolgan. L. J. Mathews, "Noorla," Trundle.

Bogan Gate (M. Broderick).—Soil, red loam, 12 inches deep; previous crop, wheat 1927; mouldboard ploughed July, 1928, combined October and again in February. Sown 7th May with combine; seed 54 lb., variety Waratah.

Gunningbland (G. F. Mill).—Soil, black clay loam, self-mulching type; previous crop, wheat 1927; disc ploughed July, 1928, 5 inches deep, harrowed in August and again in October, combined March, harrowed twice in April.

Sown with combine 20th May; seed 60 lb., variety Waratah.

Daroobalgie (D. L. N. Miller).—Soil and cultural methods as for pure seed area. Sown 23rd-24th April. Seed 60 lb., variety Gresley.

Trundle (L. J. Mathews).—Soil and cultural methods as for pure seed area. Sown 12th April with drill; seed 60 lb., variety Nabawa.

Goonumbla (G. Tanswell).—The yield was too light to warrant harvesting the plot separately.

Brolgan (W. B. Cheney).—Soil, red loam; previous crop. wheat 1927; mouldboard ploughed early in June, 1928, scarified September, harrowed March, combined March and April. Sown 17th May with combine; seed 64 lb., variety Nabawa.

Fertiliser per acre.	Bogan Gate.	Gunning- 1 land.	Daroob <b>a</b> lgie.	Trundle.	Brolgan.	
No manure Superphosphate, 28 lb 60 70 80 100 112 120 140 150 150 200 Ephos phosphate, 112 lb.	 bus. lb 11 02 13 02 14 42	bus. lb 14 56 17 38 18 44 17 24 21 52 10 18	bus. 1b. 6 00 7 10 8 00 9 15 10 30 10 30	bus. lb 10 58 10 22 11 37 13 52	bus. lb 15 50 15 50 16 40 17 00 17 30	

YIELDS of Wheat Manurial Trials.

For some years past 60 lb. of superphosphate per acre has been recommended as a safe minimum quantity for use in the western district, but of late years the results of the experiment plots, and the information gleaned from the crop competitions have suggested heavier applications as being well worthy of consideration. Several growers are applying up to 80 lb. per acre, and are well satisfied with results.

Even though the dry spring of 1929 may have been considered as unsuited to the more heavily-manured areas, yet the plots to which 100 lb. of superphosphate had been applied certainly showed to advantage. Somewhat similar results were secured in 1928, under very much the same spring conditions.

During the past three years very interesting results have been secured by Mr. G. Mill, of Gunningbland, from soil of the chocolate to black clay loam, self-mulching type. This soil is equal to the richest in the west, and produces a wonderful growth of trefoil and herbage in favourable seasons.

The following table shows the yields obtained each year with various quantities of superphosphate:—

St	iperplios	phate.		19	27.	19	28.	1929.		
	lb. per	acre.		bus.		bus.	lb.	bus.	lb.	
50	•••		• • • •	28	15				• • • •	
60	•••	•••				32	48	14	56	
70				27	54				••••	
80	•••					29	55	17	38	
100				31	13	29	40	18	41	
140	•••		•••	30	51			1		
150			•••			29	39	17	24	
200	•••		•••			24	26	21	52	
No Mai		•••	•••		••••	18	14			

MANURIAL Trials at Gunningbland.

In 1927 the results favoured the larger amounts of superphosphate. In 1928, during the growing period the plots receiving heavier applications were more even, denser and taller than the 60 lb. plot, but they did not ripen so well. To account for this the rainfall from February, 1928, must be considered. The heavy rains of that month saturated the subsoil, and the rainfall of the autumn and winter, though light, was sufficient to maintain a healthy and vigorous growth. The spring was dry; sufficient moisture was not present to sustain the maximum development of the heavier growths, and the filling of the ears was not quite so good as with the thinner plot. Another half-inch of rain in early September would have made all the difference. Even so, the reduction in yield was only small. In 1929 the heavily-manured plots had a decided advantage, even up to the 200 lb. plot.

This country is generally dotted with small low "puff" banks of a lighter colour and with freer soil than is found in the depressions, and these produce a thinner and shorter crop of wheat. The heavier applications of superphosphate have a marked tendency to even the crop in density and height.

Further experience is necessary before "heavy" applications of superphosphate can be definitely recommended, but results indicate that the greater quantity of superphosphate will not seriously depress yields, even under most adverse conditions.

Ephos phosphate failed to be of material value, and it is evidently runsuited as a phosphate fertiliser in the western district.

### Rate of Seeding Trial.

Mr. A. A. Wyatt, of Eagle Farm, Bogan Gate, conducted a rate of seeding trial. The soil is red loam 9 inches deep which last grew wheat in 1924. The plot was disc ploughed in August, 1928, springtoothed March

and sown on 14th May with a combine, with superphosphate at 50 lb. per acre; variety, Waratah.

The yields were as follows:-

					pus.	
Seed	60	lb.	per	acre	 24	12
Seed	70	lb.	per	acre	 21	24
Seed	80	lh.	ner	acre	 $^{21}$	20

For some years past results throughout the west suggest 60 lb. of wheat per acre as being the most suitable quantity to sow, with adjustments according to the time of sowing and the variety.

### Variety Trials with Oats.

The following farmers co-operated in conducting out variety trials:-

C. W. Buckland, "Kangetong," Ootha.
Curr Bros., "Murrumbogie," Trundle.
C. H. Doberer, "Good Hope," Derriwong.
J. Clatworthy, "Mayfield," Albert.
W. J. Dwyer, "Daisy Park," Bogan Gate.
A. Scrivener, "Hildavale," Gunningbland.
R. Riley, "Bardeen," Goonumbla.
G. Field and Son, "Glenwillyn," Parkes.
D. L. N. Miller, "Glenlossie," Daroobalgie.
A. P. Unger, "Stony Hill," Alectown.
H. Ward, "Gwenvale," Parkes.
J. Pearce, "Willow Farm," Reedy Creek, Mandagery.
H. Green, "Kiora," Forbes.
W. B. Cheney, "Velvedere," Brolgan.

Ootha (C. W. Buckland).—Soil, red loam; new land; mouldboard ploughed 4 inches deep in July, 1928, springtoothed October and April. Sown 16th May with a drill; seed 40 lb., superphosphate 55 lb. Germination good; growth and stooling only fair.

Trundle (Curr Bros.).—Soil, red loam; previous crop, wheat 1927; disc ploughed July, 1928; combined November; disced February; combined March. Sown with a combine 15th April; seed 40 lb., superphosphate 60 lb.

Derriwong (C. H. Doberer).—Soil, red loam; previous crop, wheat 1928; scarified April. Sown with a drill on 3rd April; seed 50 lb., superphosphate 60 lb.

Albert (J. Clatworthy).—Soil, chocolate loam; new land; ploughed October, 1928, harrowed March. Sown with a combine on 20th May; seed 50 lb., superphosphate 60 lb.

Bogan Gate (W. J. Dwyer).—Soil, red loam, 9 inches deep; previous crop, wheat 1927; mouldboard ploughed July, 1928; springtoothed September and April. Sown with a combine 1st May; seed 46 lb., superphosphate 56 lb.

Gunningbland (A. Scrivener).—Soil, light loam; previous crops, oats 1926, sudan grass 1927; disced 4 inches in August, 1928, springtoothed January, scarified March, springtoothed April and May. Sown 10th-14th May with a drill and harrowed; seed 44 lb., superphosphate 50 lb.

Goonumbla (R. Riley).—Soil, red loam; previous crop, wheat 1927; disced 3½ inches in June, 1928; springtoothed end of August, harrowed February, springtoothed and harrowed March, and again in April. Sown with a combine 18th May and harrowed; seed 60 lb., superphosphate 65 lb.

Parkes (G. Field and Sons).—These plots were grazed on 10th June.

Daroobalgie (D. L. N. Miller).—Soil and cultural methods as in pure seed wheat areas. Sown 23rd-24th April with a combine; seed 50 lb., superphosphate 56 lb.

Alectown (A. P. Unger).—Soil and cultural methods as in pure seed wheat areas. Sown with a combine on 23rd-26th May; seed 37 lb., superphosphate 60 lb.

Parkes (H. Ward).—Soil, grey to red light loam; previous crop, wheat 1925; disced October, 1928, and again in March, combined April. Sown with a combine 17th May; seed 53 lb., superphosphate 60 lb.

Mandagery (J. Pearce).—Soil, red loam; previous crop, wheat 1927; mouldboard ploughed August, 1928, combined October, February, March, and April. Sown with a combine 21st May; seed 50 lb., superphosphate 56 lb.

Forbes (H. Green).—Soil, red loam; previous crop, wheat 1928; disc ploughed February, 1929, disc cultivated April. Sown with a combine on 25th April; seed 60 lb., superphosphate 60 lb.

Brolgan (W. B. Cheney).—Soil, red loam; previous crop, wheat 1928; scarified April, 1929. Sown 18th May with a combine; seed 50 lb., superphosphate 50 lb.

YIELDS	οf	Oat	Variety	Trials.

Variety.	Ootha.	Trundle.	Derriwong.	Bogan Gate.	Gunningbland.	Goonumbla.	Daroobalgie.	Alectown.	Parkes. (H. B. Ward.)	Mandagery.	Forbes.	Brolgan.	Albert. (J. Clatworthy.)
	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.Ib.	bus. lb:
Mulga	15 27	15 30	15 28	12 26	23 34	25 04	18 <b>0</b> 0	10 05	20 28	28 00	15 00	10 00	9 24
Myall	17 02	12 20	•••		***		25 00					10 20	1 ] 13
Belar	16 15	13 15	15 20	14 00	17 11	26 39	18 00	15 32	20 33	29 28	12 30		6 16
Gidgee	13 14		20 12	•••	21 22			12 26				10 00	5 24
Buddah	10 36				·	·		3 36	,			8 00	
Sunrise		11 03			14 27		22 00	6 09					7 08
Palestine				12 30					15 00		A=1 ,		
Guyra					27. 07				20 00		,	11 20	
Lachlan					13 19	,		٠	]	4		6 00	
Algerian	-			-			-			35 10			

# The Latest Information about PASTURE IMPROVEMENT

THE work of pasture improvement is uppermost in the minds of many Pastoralists and most Dairy Farmers at the present time, as landowners are anxious to increase the carrying capacity of their holdings and the production per capita of their stock.

The natural pastures of Australia are the basis of national income, for they support practically the whole of the sheep and cattle of the country. Therefore the study of grasses and of the principles underlying their successful production are worthy of the greatest attention.

In our usual catalogue of farm seeds for autumn planting we are this year publishing a long and very complete article summarising the information recorded to date as to the behaviour of the numerous grasses and forage plants under New South Wales conditions. In addition, suitable mixtures of varieties are suggested for a very large number of the varying soil and climatic conditions.

The data has been compiled on the very best authority, and, without doubt, will be of the greatest interest to those who are considering laying down grasses on any of their lands.

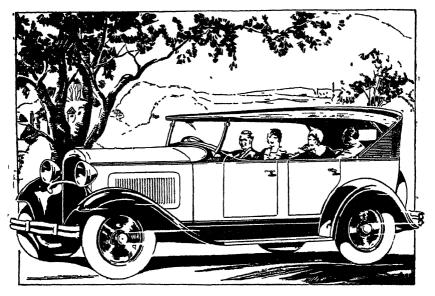
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DODGE BROTHERS SIX

It may be said that with the introduction of the earlier-maturing types of oats, such as Sunrise and Mulga, a new crop was given to the wheat areas, which is proving most valuable for winter fodder, for fodder conservation, and as a rotation crop with wheat. At first the early varieties were considered essential to our conditions, but a place is also being found for the later types, such as Belar, Guyra, and probably Algerian. Experience has shown the later types, under grazing conditions, to produce green growth into the early summer, which is an asset when late lambs are to be marketed. Mulga and Sunrise will run into head and ripen in October, but the later the maturing habit of the variety, the longer will green growth be available if it is kept grazed.

All oat varieties shell badly, and it is unwise to have even 100 acres of one variety ripening at the same period. The use of two or three types will ensure a succession of early green fodder, will distribute the ripening period to suit the progress of harvesting, and enable a suitable late grazing type to be grown and used as such if necessary.

Mulga still stands out in favour in the west, but Lachlan is being replaced by Belar or Guyra, both of which are gradually coming to the fore. Gidgee is quite a good oat, though it can hardly be recommended in place of Mulga.

### Western District (Dubbo Centre).

B. M. ARTHUR, H.D.A., Senior Agricultural Instructor.

DURING 1929 the following farmers co-operated with the Department in conducting cereal experiments in this district:—

J. D. Berney, "Kildara," Eurimbla, via Cumnock.
Quirk and Everett, "Narrawa," Wellington.
P. J. Baker, "Killarney," Nubingerie.
James Beil, "Glenara," Wollumbi Soldiers' Settlement, Geurie.
N. H. Hubbard, "The Wilgas," Wongarbon.
Harold J. Harvey, "Kindalin," Dubbo.
Barry O'Neill, "Baringa," Narromine.
S. C. Taylor, "Happy Valley," Wyanga.
C. Lowe, "Claydon," Coboco, via Dubbo.
J. Parslow, "Cooya," Balladoran.
W. G. Law, "Thistledown," Gilgandra.
J. S. Hodgson, "Studholme," Armatree.
Lindsay Green, "Denison Farm," Leadville.
Norris and Williams, "Morven," Weetalibah, via Coolah.

The plots failed at Wellington, Narromine, and Coboco owing to insufficient moisture being present at the time of sowing to germinate the wheat, much of which malted and rotted before light rain occurred some six weeks later. All these were sown on heavy clay soils (one being self-mulching) and subsequent germination and growth were too patchy for comparative results to be obtained, though good seed was harvested at Wellington.

### The Season.

The year 1929 was one of severe trial to many farmers in the district, particularly as it followed two consecutive adverse seasons. The rainfall was extremely light and patchy, the aggregate between July, 1928, and October, 1929, only averaging between 12 and 13 inches; in fact, in some centres the rainfall registered for 1929 was the lowest on record. Consequently cereal crops were on the light side; a considerable area failed to germinate satisfactorily and was fed off, or failed altogether, and it was only fairly satisfactory rains from August onwards that saved the majority of crops from total failure.

Following good rains in July, 1928, which enabled ploughing at that time to be carried out under good conditions, the rainfall for the balance of 1928 was very light, and did not average much over 2 inches at any centre. This did not permit of fallows being worked to advantage before harvest, and in the majority of cases they were not touched at all. January, 1929, was also very dry and hot, and soils generally contained very little conserved moisture up till the end of that month. During February good thunderstorm rains of a patchy, and heavy nature, were experienced on several occasions, and these permitted fallows to be well worked, as weed growth was negligible, and had not to be taken into account. The rainfall during March was also fair, and further workings were possible to conserve this moisture and assist in consolidation of the soil. Good soaking rains early in April saturated the soils and enabled early sowing to be proceeded with. No further rain of any consequence fell until early in June—a period of nearly two months. Consequently in areas sown during late April or May soil moisture was lacking, except on light sandy loams, and germination results were largely very poor and patchy, especially on the heavy clay loams and soils, which predominate, particularly in the Narromine and Wellington-Geurie districts. Rainfall during June and July was very light, and crops were struggling to maintain growth, but good rains during August saved the situation and revived all well-germinated crops wonderfully.

Another critical period was experienced during September, but further useful rains late that month and during October brought crops to maturity, and gave average yields well above expectations of the previous month, though yields generally were light.

The October rains caused a good deal of late and secondary growth, and this delayed harvesting operations considerably. Harvesting was not completed before the end of the year. Much grain was bleached, also lacked histre, but was of f.a.q. standard except in certain instances, where grain had badly pinched, due partly to the late appearance of stem rust.

#### RAINFALL Records.

	Earlmbla.	Wellington.	Dubbo. (H. Harvey.)	Wongarhon.	Nubingerie.	Narromine.	Wyanga.	Balladoran.	Gilgandra.	Armatree.	Leadville.	Weetalibah. (Coolah).
1928.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.
July August September October November December 1929.	35 43 157 66 20	34 31 89 70 9	577* 10 18 49 71 28	  68 23	Not available.	30 12 77 104	56 15 77 78	226  13 117 57 31	183  9 80 47 40	174 21  39 58	 45 74 40	Not available.
January February March	263 80	24 227 157	35 338 178	36 409 95	476 97	20 270 115	21 302 167	42 260 103	43 299 70	45 90 35	40 338 90	133 404 91
Total on fallow	664	641	1,304	631		628	716	849	771	462	627	
April  May  June July  August  September  October  Total growing period	41 71 24 160 93 125	109 16 81 53 130 119 155	117 26 74 30 121 72 214 654	121 ,67 64 57 122 86 164	63 31 62 48 95 67 100 466	120 3 52 77 91 71 180	88 36 35 70 138 80 118 565	145 15 80 65 154 110 203	164 8 70 51 105 98 98	220 14 60 33 136 129 187	210  61 35 161 85 139 691	154 25 15 24 177 44 104
Grand Total	1,295	1,304	1,958	1,312	1,039	1,222	1,281	1,621	1,365	1,241	1,318	1,171

\* March to July.

### Cultural Details.

Eurimbla.—Chocolate clay loam, limestone formation, old land; cropped to wheat 1927; mouldboard ploughed August 4½ inches deep, springtoothed March, harrowed late March, scarified mid-April with harrows attached. Hoe drilled 1st to 3rd May on good seed-bed, using 65 lb. wheat, 60 lb. oats, and 80 lb. superphosphate per acre. Harvested mid-December. Wild oats prominent, but beaten by good germination. Flag smut in Federation. Onas, Ford and Cadia.

Nubingeric.—Heavy chocolate clay loam, stony outcrops, clay subsoil at 6 inches; old land; last cropped to wheat 1926; mouldboard ploughed 4 inches deep in July, harrowed late February, scarified early March, harrowed late March, scarified late April. Sown with rigid tyne combine on 3rd to 4th May with 55 lb. wheat, 50-60 lb. oats, and 56 lb. superphosphate; ground dry; seed sown on firm bottom. Harvested late November. A portion across all plots was not ploughed till September, and the difference in favour of early ploughing was very noticeable.

Wollumbi.—Red to chocolate clay loam, stiff subsoil at 6 inches; old land; last crop plots 1927; disc-ploughed 4 inches deep in August, disc-ploughed 3 inches deep in February, harrowed early March, springtoothed:

mid-March, harrowed mid-April. Combine sown on 5th to 6th May with 58 lb. wheat, 40 lb. oats and 56 lb. superphosphate per acre. Harvested late December. Patchy, delayed germination, with many wild oats competing with sown crop; flag smut prominent.

Wongarbon.—Medium red loam, clay subsoil at 6 inches; six crops, previous crop wheat in 1927; disc ploughed early November 3 inches deep, springtoothed mid-February, harrowed mid-March, springtoothed mid-April. Combine sown with tractor; wheat 45-50 lb., oats 55 lb., superphosphate 75 lb. per acre. Harvested mid-November. Germination good, and plots promised at least a six-bag average, but after harvesting Wandilla, the balance of wheat and oats were hit by a severe hailstorm which thrashed more than half the grain out of some plots, especially those with short straw (Federation, Nizam and Union) and also the oat plots.

Dubbo.—Medium red sandy loam, variable depth with drift sand patches; eight crops, last cropped plots 1926; disc ploughed 5 inches deep in March, 1928, disced June shallow, scarified September, springtoothed February and March, harrowed late March and again in early April. Combine sown 25th to 27th April with 60 lb. seed and 70 lb. superphosphate per acre. Harrowed after sowing. Soil in good moist condition, giving good germination. Harvested late November. Oat plots were cut and thrashed to avoid loss by presence of green growth. Flag smut in Waratah, Duri, Union and Federation. Buddah oats thrashed by light hail.

Wyanga.—Medium red loam, seven crops, wheat 1927, disc ploughed 3 inches deep in July, springtoothed mid-February, harrowed mid-March. Combine sown 9th to 10th May. Fair germination on too loose a seed-bed. No weeds. Amount of seed, wheat 45 lb., oats 40 lb., superphosphate 60 lb. per acre. Harvested early December.

Armatree.—Medium red loam, clay subsoil at 5 inches; eight crops: disc ploughed early in July, springtoothed mid-February, springtoothed mid-April. Sown with hoe drill 9th to 10th May with 55 lb. seed and 50 lb. superphosphate per acre. Fair germination in patchy seed-bed. Harvested late November. Manured plots prominent during early stages of growth, but dry spring caused premature ripening and pinching, while assisting unmanured area.

Balladoran.—Variable grey clay to red sandy loam; old land, which became very dirty under previous owner; plots 1927; disc ploughed 4 inches deep in early June, springtoothed in early February, springtoothed late in March and again in late April. Sown with disc drill on 6th and 7th May with 55 lb. wheat, 50 lb. oats, and 50 lb. superphosphate per acre. Harvested late November. Nabawa plot affected by sheep. Flag smut prominent in susceptible varieties.

Gilgandra.—Black to chocolate clay self-mulching loam, clay subsoil, alluvial formation; old land; last cropped wheat 1924; mouldboard ploughed 3 to 4 inches deep in June (broke up lumpy), scarified deeply when dry in August, harrowed November, harrowed and crossed mid-February, scarified late February, harrowed late March and mid-April, scarified late April. Hoe

drill sown 7th to 8th May with 52 lb. seed and 56 lb. superphosphate per acre. Germinatiön was very good on heavy black soil, but a certain percentage was lost by mould and wire worms. Manured areas ripened too rapidly for season with consequent pinching of grain, allowing unmanured sections to fill plump grain on a lighter stand, and give best results.

Leadville.—Gravelly clay loam, slate derivation, clay subsoil at 5 inches; old land; cropped to wheat 1926; disc-ploughed 4 inches deep in August-September, springtoothed and crossed November, with knife bars attached, harrowed mid-February, springtoothed late February, springtoothed, and crossed early April. Sown with disc drill 22nd to 24th April with 53 lb. seed and 65 lb. superphosphate per acre. Harvested late November. Buddah plot affected by severe wind and rainstorm. Very fair yields for season. Rainfall was considerably less on plots than that registered at homestead.

Weetalibah.—Red sandy loam, deep, new ground containing coarse blady grass in natural state; cleared 1928; disc-ploughed August 2 to 3 inches deep, disc ploughed November 4 to 5 inches deep, harrowed late January, springtoothed mid-February. Combine sown with tractor 24th April. Seed 45-55 lb. and superphosphate 56 lb. per acre. Germination good, but heavily fed-off up till August; sheep pulled up many plants. Harvested early December. Fair yields after heavy feeding off, and new ground.

### Notes on Wheat Varieties.

The outstanding varieties of this season's trials were again Nabawa and Bobin, and also Penny, Rajah, Wandilla, and Exquisite.

Nabawa (Bunyip x Gluyas Early), a Western Australian mid-season variety, highly resistant to flag smut, was tested at all centres, and gave highest yields at four centres, second at four others, and was once third. It also returned consistently high yields wherever grown, and consequently will be largely sown this coming season. As a result of two years' experience it is apparently a good dry weather wheat, but so far has not been tested out in a good season in these districts.

Bobin (Thew x Steinwedel), a mid-season to early maturer, also did well, with one first and four seconds out of six tests. It is a tall-strawed, white-eared wheat, and is fairly resistant to flag smut.

Penny, also a Western Australian wheat, yielded well where tested. It is a slow-maturing, white-eared, tall-strawed wheat, which is not particularly liable to flag smut.

Wandilla (Federation x Yandilla King) still continues to give satisfactory returns in many parts of this district, and also shows high resistance to flag smut.

Rajah, a Victorian club-headed wheat, did well in the Gilgandra district. It is fairly short in the straw, white-eared and fills the ear well underdry conditions.

Exquisite (Gluyas x Atlanta x Gluyas) shows distinct promise as a late-maturing wheat, and it also is highly resistant to flag smut; tall-strawed, brown-eared, with occasional blue to black colourings.

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YIELDS of Wheat Variety Trials.

	1	1	1								1	
Variety.		Eurimbla.	Wongarbon	Dubbo.	Wollumbi. S S.	Nubingerie.	Wyanga.	Balladoran.	Gilgandra.	Armatree.	Leadville.	Weetalibah.
Federation Nabawa Wandilla Bobin Duri Waratah Union Rajah Riverina Aussie Penny Nizam Ford Gallipoli Ranee Clarendon Gresley Exquisite Cadia Onas Duchess Geeralying Federation		17 49 24 19 24 51	4 18 16 50 24 36 12 11 14 12 11 46 11 16   8 47 	bus.lb. 16 54 25 52 24 13 17 40 17 23 17 2 22 16 18 0 19 15 18 13	6 26 11 47 6 12  6 51 9 51  11 13   	14 12 17 9 14 10   19 8  16 52 15 7 	10 38 6 46  8 2 6 27 	6 26 8 5  11 25 11 23  9 5 11 40 	9 43 10 48 11 17   13 11  8 25		19 51 15 29 16 31  16 9  12 59 14 2 	bus.lb. 9 8 14 22 16 32 14 36
(Longerenor Bald Early Plowman's	•••						8 25 10 26					
Yandilla K Gullen Bredbo		1							11 15 10 55 10 48			
Gluyas Ear	ly											12 51

Federation.—A trial of Federation from Longerenong College, Victoria, was again made—after the seed had become acclimatised—and this time it outyielded the Departmental strain by over a bushel.

Federation wheat was used at all centres as a standard variety both with late and early maturing varieties.

Duri (Hurst's 14 x Canberra) yielded consistently where tried; it is a fairly early-maturing type of wheat, very similar in appearance to Canberra, but not quite so liable to diseases.

Gullen (Yandilla King x Zaff) produced a grain of wonderful appearance and weight—hard, bright, shotty, and attractive.

#### Fertiliser Trials with Wheat.

A small manurial trial with Federation was incorporated in all the wheat variety trials. As the use of superphosphate is only gradually being extended in this portion of the western district, and there are many who cannot yet see its advantages as a means of increasing yields when associated with up-to-date farming practices, it was thought advisable to adhere to the practice of demonstrating the difference obtained between an average

application of superphosphate, and no manure, rather than to go in for extensive rate of fertiliser tests, in the attempt to ascertain the best amount to use.

RESULTS of Fertiliser Trials with Federation Wheat.

Amount of Fertiliser per acre.	Eurimbla.	Wongarbon.	Nubingerie.	Dubbo.	Balladoran.	Gilgandra.	Armatree.	Leadville.	Weetalibah.
Superphosphate. 50 lb 55 lb 65 lb 70 lb 75 lb 80 lb	bus.lb 17 49 9 41	   4 18	14 10 	18 13	6 26 		5 35   	15 41 	9 8  
Increase from super- phosphate.	8 8	1 41	57	5 22	27		1 0	3 52	1 10
Decrease from super- phosphate.						8	•••		

The tests indicated an increased yield, varying from half to 8 bushels, at all centres except one, from applications of from 50 to 80 lb. per acre. The decrease at Gilgandra was only 8 lb. and this centre and several others would probably have shown substantial increases, if suitable rain had been experienced, when the ear was filling. Superphosphate tends to bring about an earlier maturity, and in these particular cases the manured areas were too forward in a dry spell to benefit from serviceable rains, which occurred during the latter part of October. Consequently the grain from the thicker and more advanced manured crops tended to pinch, while those not manured filled a plump sample of grain. But these cases are exceptional, and manure generally enables crops to stand dry spells better than those not fertilised owing to the increased and deeper root system available.

A large-area fertiliser trial was also conducted by Mr. W. G. Law at Gilgandra on heavy, black, self-mulching clay loam, in two separate paddocks with early and midseason varieties. The results obtained were variable, and were due, not so much to the variation in the superphosphate used, as to the patchy germination on the heavy soil due to a difference of a day or two in the time of sowing.

YIELDS of Fertiliser Trial with Federation Wheat at Gilgandra.

Amount of	f Superphos	phate per acre.	Area.	Yield per acre.
No manu 41 lb sup 53 79 108		ate	acres. 10.88 19.57 27.32 36.65 28.02	bus. 1b. 9 28 8 48 9 26 8 18 7 10

The no-manure plot was sown first and the others in order spread over a week from 16th to 21st April, with seed at 52 lb. per acre. The cultural methods were the same as for the variety trials.

A further test was made with Canberra and Riverina wheats in the adjoining paddock on a fallow mouldboard ploughed 4 inches deep in July, scarified August, harrowed November, scarified December, and again in February, harrowed March, scarified late April: Sown 27th to 30th April with hoe drill, using 52 lb. seed per acre, and 54 lb. superphosphate per acre on the manured plots.

YIELDS	$\mathbf{of}$	Fertiliser	Trial	with	Riverina	and	Canberra.
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Variety.	Area.	Yield.	Variety.	Arca.	Yield.
Riverina (manured) ,, (unmanured)	acres. 24·68 26·51	bus. lb. 5 13 3 53	Canberra (manured)		bus, lb. 7 47 4 7
Increase from manuring	•••	1 20	Increase from manuring	•••	3 40

#### Rate of Seeding Tests with Wheat.

Rate of seeding tests were carried out at six different centres with amounts of seed ranging from 35 lb. to 80 lb., and with not less than 10 lb. difference. Owing to prevailing dry conditions the heavy application of seed produced too thick a stand which tended to hay off. Moderate quantities of seed, ranging from 50 to 60 lb. seed, gave the best results this year. Further tests along similar lines will be continued in order to try and ascertain over a number of years the most suitable quantity to use to suit all conditions. At Wongarbon areas with 45 lb. and 65 lb. seed were seriously knocked about by hail.

YIELDS in Rate of Seeding Test with Wheat.

'Amount	Eurin (Nab	nbia. awa).	Wongs (Beni		Duk (Unic		Gilga (Nab		Balladoran. (Riverina.)	Leadville (Wandilla.)
per acre.	Area.	Yield.	Area.	Yield.	Yield.	Area.	Area.	Yleld.	Yleld.	Yield.
1b. 35 40 45 50 65 70 76 80	9 76 5 04  4 79	24 13	34 7 32 3 46 3		7 93  10 72	14 56	18 71  19 63  13 89	***	12 37  13 10 	bus.1b 15 22 15 29 14 17



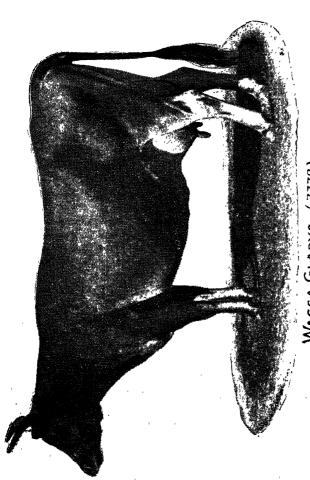
Stationed at Wollongbar Experiment form

Darbalara, World's champion Scottah Pride of Gowne Park (3797), First and Champion, R. A. Show, Sydney, 1927 First and Reserve Champion, R. A. Show, Sydney, 1928 Morning Star is ex Melba 15th of Dar cow of all breeds—32,522 5 lb. milk, 1,614 l lb. butter fat in 365 days, Jersey Finvoy Golden Noble (imp. N.Z., Vol. 15). DEPARTMENTAL herds include the following stud bulls - Cuern.ey Hopeful of Wollongbar (499), Champion, R

GUERNSEY Young bulls available for sale from tested Dams of the following breeds -**JERSEY** MILKING SHORTHORN

AYRSHIRE.

The UNDER SECRETARY, Department of Agriculture, Sydney. Application should be made to-



# WAGGA GLADYS (7778)

(Stationed at Hawkesbury Agricultural College

Awarded Champion Ribbon, Peter's Guernsey Cow: Wollongbar Parson's Red Rose 20th (730). Holds a world's record for butter production for the Guernsey 1,302'62 lb, commercial butter in 365 days. Ayrshire Cow: Miss Dot of Glen Innes (3760)—19,562'5 lb, milk: 1,088 64 lb, This cow holds THE following are the herd-testing records of some of the cows in Departmental herds:—Jersey Cow: Wagra Gladys (7778) record for butter production for the Jersey breed—20,835 lb, milk; 1,384.80 lb, commercial butter in 365 days. Awardee commercial butter in 365 days,

Heifers and bulls of proved producing lines of the following breeds are available for sale:-GUERNSEY. IERSEY. MILKING SHORTHORN,

For further particulars apply to-The UNDER SECRETARY, Department of Agriculture, Sydney,

#### Oat Variety Trials.

Oats for grain were tested at ten centres with Algerian as a standard variety for comparison. Belar, and Guyra, two midseason varieties, again gave the most consistent returns, and after a number of years' trial, appear to be the best for grain and hay production for this part of the west, even after feeding off. If sown early in February or March, it is possible to obtain six months' green feeding from them, and then mature a payable grain or hay crop.

Mulga and Buddah are the best of the fast growers for green feed purposes, but are liable to lodge, and shed their grain easily, and are not recommended for grain or hay production.

Algerian in one or two instances gave good returns, benefiting by the late October rains, when other varieties were too far advanced in maturity.

Plots at Wongarbon, Wollumbi, Armatree, Dubbo, and Leadville were affected by either hail, or severe wind and rainstorms.

Variety.	Eurimbla.	Wongarbon.	Nubingerie.	Wollumbi.	Dubbo.	Wуви <b>дв.</b>	Balladoran.	Gilgandra.	Armatree.	Leadville.
	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.	bus.lb.
Algerian	 21 35	5 5	21 14	5 30	27 1	8 31	10 33	9 36	8 16	33 8
Belar	 23 2	5 27	19 7	4 34		•••	•••	22 2		27 15
Buddah	 14 23		14 17		15 30	8 24	17 25		4 2	18 36
Guyra	 		23 32		27 1	11 24	10 31	17 17	8 29	***
Gidgee	 	lost.		•••						,
Kellsall's	 		,		29 2					
Lachlan	 16 36			•••	,	8 8			6 7	
Mulga	 	3 25	19 1		30 25	***	15 18	15 21		27 3
Myall	 			2 27				.,.		
Palestine	 		23 36	***					,	
Sunrise	 			2 32						
					1				1	l

YIELDS of Oat Variety Trials.

#### NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.

THE Co-operative Bud Selection Society, Ltd., supplied the following selected Valencia Late orange buds to nurserymen during the 1929 budding season, trees from which should be available for planting during this present year:—

T. Adamson, Ermington 3,100 T. Eyles, Rydalmere 3,500 F. Ferguson and Son, Hurstville 1,500 R. Hughes, Ermington 1,000
F. Ferguson and Son, Hurstville 1,500
D Throbas Demination 1000
G. McKee, Ermington 3,000
L. P. Rosen and Son, Carlingford (late of Epping) 11,400
Swane Bros., Ermington 500

-C. G. SAVAGE, Director of Fruit Culture.

### Lucerne as Pasture in Western Districts.

FURTHER RESULTS AT TRANGIE AND COWRA EXPERIMENT FARMS.

#### Trangie Experiment Farm.

J. N. WHITTET, H.D.A., Agrostologist.

Sowing lucerne for grazing purposes is now recognised as one of the chief forms of pasture improvement in the comparatively drier districts of this State.

The total area under lucerne in New South Wales has shown a consistent increase during recent years as will be seen from the following figures:—

#### Total Area under Lucerne.

		Acres.	1		Acres.
1903-04	 •••	80,534	1925-26	•••	 170,190
1913-14	 •••	106,309	1926-27		 185,881
1923-24	 •••	131.266	1927-28		 213,285
1924-25		148 275			

In the drier parts of the State the increase in most of the divisions in recent years has been most marked, as will be seen from the following table:—

#### AREA under Lucerne in certain Divisions, 1923-28.

Division.		1923.	1924.	1925.	1925.	1927.	1928.
North-Western Slopes Central-Western Slopes South-Western Slopes North Central Plain Central Plain Riverina Western Division	28	acres. 13,947 8,441 19,191 466 157 5,047	acres. 11,363 10,635 23,464 142 132 7,875	acres. 13,547 11,668 28,271 176 166 8,097 122	acres. 15,047 13,080 40,499 162 23 8,382 117	aores. 14,647 15,893 45,456 1,078 67 9,180	acres. 20,442 21,364 50,812 1,129 80 9,026 282

In the drier parts of the State light seedings of lucerne are advocated, and excellent stands are obtained on average wheat country from the use of 2 to 3 lb. per acre. The plants from this light seeding form large crowns, and are found to stand stocking better than paddocks sown at the rate of 10 to 12 lb. of seed per acre as the lucerne from this thick seeding is crowded together and consequently spindly plants develop. Apart from this fact a considerable saving in the cost of seed is effected—a very important consideration, especially where large areas are being established.

Linked up with this matter of light seedings is a very important point, viz., the use of good quality seed. Well-grown and carefully-harvested

lucerne seed should germinate at least 80 per cent, and test results of from 90 to 98 per cent, are common when good machine-dressed samples are handled. Graziers and farmers should always bear in mind that the Department's seed laboratory is always at their disposal, and purity and germination tests of lucerne and other agricultural seeds are made for them free of charge. A small charge is made to vendors of seed for similar service.

Lucerne should not be allowed to become too mature before being grazed, as many of the stems become woody and are then neglected by the animals, which eat only the leaves and tops, and the subsequent growth from the crowns is considerably delayed. (See Figs. 1 to 3.)

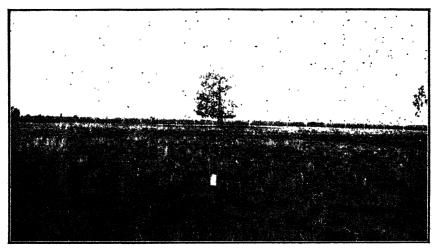


Fig. 1.—These Plants were Allowed to Become too Mature Before being Grazed.

Note the large number of dried stems remaining on the plants.

By grazing the area not later than the early flowering stage this trouble will be overcome, for the sheep will then clean up the paddock thoroughly. The use of comparatively small paddocks and stocking the areas heavily in order to feed them off rapidly will assist in effectively feeding off the growth. Chemical analyses of lucerne made at various stages of growth show that when the crop is in the bud stage the feed is richer in protein and mineral ash, and lower in fibre than when it is more mature.

The results previously obtained from grazing sheep on lucerne at Trangie and Cowra experiment farms, and from other areas in the far western section of the central western slopes division, were published in the January, 1929, issue of this *Gazette*, and in that article also full particulars of the methods of establishment and the care and management of lucerne in areas of limited rainfall were given. Copies of the article may be obtained on application to the Department.

#### Carrying Capacity at Trangie.

A summary of the previous trials at Trangie Experiment Farm shows that for the period 1st June, 1926, to 31st May, 1928, the average carrying capacity of this area of lucerne was 2.21 sheep per acre per annum. The animals were grazed from June, 1926, to December, 1927, on 100 acres sown in the autumn of 1925, and an additional area of 60 acres, established in May, 1927, was included in the test for the remaining five months. The total rainfall for the duration of the trial in six-monthly periods was:—

				inches.
June-November, 1926	•••		•••	3.46
December, 1926-May, 1927				6.47
June-November, 1927				6.67
December, 1927-May, 1928	•••	•••		16.17

The ability of lucerne to withstand dry conditions was exemplified in the carrying of an average of 2.07 sheep per acre during the period June, 1926-November, 1927, on 16.60 inches of rain. The average rainfall at Trangie over a period of thirty years is 17.84 inches.

The stocking of this 160-acre area for an additional period of twelve months is shown in the following table:—

STOCKING of Lucerne Pastures, Trangie Experiment Farm.

Period.	Period.									
1928—										
June-September, 5 days	•••		800							
,, ,, 9 ,,			1,400							
October, 10 days			1,400							
November, 8 days			540							
,. 4 ,,			1,380							
December, 10 days			533							
1929—		1	•							
January, 9 days	•••		533							
February, 5 ,,			533							
March, 8 ,,			525							
,, 8 ,,	- 4 +		625							
April, 24 ,,			300							
May, 20 ,,			300							
,, 11 ,,	***		900 ewes and 600 young lambs.							

The 600 young lambs on the trial during May are not included in the calculation of carrying capacity, as they were only a few weeks old at the time of entering the paddock.

The low figure recorded for carrying capacity during the first four months of the test was mainly due to lack of rainfall. May, 1928, was a very dry month, only 33 points being registered. It must be borne in mind, however, that the area had been heavily grazed in March, April, and May, 1928, the 160 acres carrying 455 sheep for ninety-two days.

The average carrying capacity for the period 1st June, 1928, to 31st May, 1929, was 1.46 sheep per acre, whereas natural pastures for this period only carried a sheep to 2 acres.

The period under review was one of the driest experienced in the district for many years, as only 7.97 inches of rain fell. The monthly totals were:—

1928	8.	:	Points.	192	1929.						
June		•••	49	January			38				
July	•••		162	February	•••		188				
August	•••		5	March	•••		97				
September	•••		4	April			108				
October	•••		50	May			4				
November			74	•							
December			8	Total	l		787				

#### General Remarks.

One of the main advantages of lucerne as pasture in dry areas lies in the fact that some green feed is available for the animals when the natural pastures are dry. Such green picking is of inestimable value in keeping stock in a healthy condition.

The results of three years' grazing (1926-29) at Trangie show that an average of 1.96 sheep per acre per annum has been carried on 160 acres, 100 acres of which were established in 1925, and the remainder in 1927. The total rainfall for the three years was 40.64 inches, or an average of 13.55 inches per annum. Of the total rainfall 14.44 inches fell during January to April, 1928, inclusive, thus leaving only 26.20 inches for the remaining period of two years and eight months.

In the Dubbo district (average annual rainfall for fifty-six years, 21.99 inches) plantings made on average wheat country during the autumn and early winter months of 1929 indicated that on fallowed land lucerne can be satisfactorily established, even though the rainfall be sparse. In some cases good stands of lucerne were obtained on worked stubble land (short fallow), where the total rainfall for the period April to October inclusive was only 4.01 inches. Where the lucerne was planted with a wheat crop inferior results were obtained to where lucerne was sown alone.

#### Cowra Experiment Farm.

#### R. N. MEDLEY, H.D.A., Experimentalist.

The practice of grazing lucerne is a comparatively recent one, it being considered, not so very long ago by most landholders, as not good farming practice and as detrimental to the crop to allow stock to have access to lucerne. To the fat-lamb producer the practice of soiling lucerne, or for that matter any other green crop, is one of doubtful economy, and so the utilisation of lucerne as a grazing proposition commends itself on this score alone.

That lucerne can be successfully grown on the hill country in the Cowra district has been conclusively demonstrated by experience at Cowra Experiment Farm. Although lucerne has been successfully grown on the higher land at this farm for many years, it is within only comparatively recent years that it has been utilised to any great extent as a grazing crop. Prior to about 1920, lucerne had been grown on small areas that were liable to

erosion, and the crop was mainly used for hay or soiling purposes. In 1920, an old worn-out wheat paddock that had commenced to wash badly was sown to lucerne, and this stand has up to the present time been heavily grazed with all classes of stock, proving a most valuable standby during dry periods of the year, and giving good grazing when there was a dearth of other grazing forage. Unfortunately no record was kept of the stocking and consequently the carrying capacity of that stand cannot be given. It is safe to state, however, that it was quite a considerable improvement upon that of the natural pasture.



Fig. 2.—"Olose up" of Plant from Paddock Grazed at Proper Stage of Maturity.

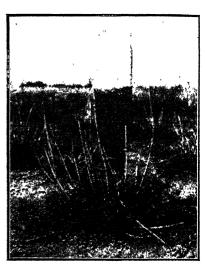


Fig. 8.—Showing how early Development is Retarded by the old dry stems of the Previous Growth.

The experience gained from this stand of lucerne has had the result of further extensions being made in the area devoted to the crop at this farm. Not only was the crop a valuable standby during dry periods, but it proved invaluable for "topping-off" young lambs for market, in this respect being decidedly superior to the natural pasture and other crops available at that time of the year. Further, the lucerne effectively stopped the erosion that was taking place when the stand was laid down, and this latter property is sufficient to justify the sowing of this crop by many farmers in this district whose land is subject to erosion, which has been causing increasing concern during the past few years. It will be found in most instances that lucerne will effectively bind the soil, and, provided the soil has not been already scoured into deep gutters, will greatly decrease the danger of erosion.

The area devoted to lucerne on Cowra Farm was extended by plantings during the spring of 1926 and 1928. In the former year the rate of seeding was 8 lb. per acre, but later experience has shown that quite satisfactory stands can be established from 4 lb. seed per acre, provided that good seed is obtained. The seeding for the 1928 planting was at the rate of 4 lb.

per acre, and at the present time the stand is vigorous, healthy, and stands up to grazing excellently. Seeding at the rate of 4 lb. per acre can be adopted by farmers in the Cowra district who intend establishing lucerne for grazing purposes on hill land, and the cost of laying down a lucerne pasture thus considerably reduced.

The table given below contains details of the carrying capacity of these stands of lucerne for the twelve months period ending 30th September, 1929. As will be seen from the rainfall figures, the total precipitation for the period was very considerably below the average for the district, which is between 23 and 24 inches for the calendar year. Not only was the rainfall below the average, but most unseasonal conditions prevailed. The summer of 1928-29 was one of extreme severity, exceedingly high temperatures prevailing, while the winter of this year was notable for the successive severe frosts and low temperatures generally. From this it will be seen that the climatic conditions have not been favourable to the growth of lucerne, so that the figures given in the following table have an added value, and are of greater importance in demonstrating the value of this crop.

STOCKING of Lucerne Pasture at Cowra Experiment Farm.

	Per	iod.			Monthly Rainfall.	Area.	Number of Sheep.	Carrying Capacity for 3 months periods.
1928					points.	acres		sheep.
October.	2	days			170	45	592	
November.	2	,,	•••		•••••	45	592	
	7	**		•••		45	542	*****
	5	,,		•••	105	45	484	
December	6	,,		•••		35	584	
	20	,,		•••	11 (286)*	80	230	3.93
1929		"	•••	•••	()			0.00
January,	12	days				80	230	
J	19				1	45	230	
February,	28	"	•••	•••	157	45	230	******
March,	12	,,	•••		307 (465)*	45	230	3.51
April,	-8	39	•••	•••	107	80	150	2.01
May,	4	••	•••	•••	101	45	296	******
may,	6		•••	•••	42	45	150	******
T	13	,,	•••	***	44	45	296	*****
June,	17	**	•••	•••	305/05/14	80		*****
7.1.		,,	***	•••	125 (274)*		296	2.3
July,	3		***	•••	*****	80	296	•••••
	2		•••	•••	*****	80	315	*****
	4		***	***	*****	80	14	••••
	3	77	•••	***	*****	80	67	
	1	day	***		*****	80	110	
	1	,,	***		21	80	121	.,
August	19		•••	•••		80	120	******
-	8	12	•••	***	211	80	308	
September,	, 4	,,,				80	524	******
•			•••	•••		80	561	
	7		•••	,	107 (339)*	45	607	2.7
TOTAL	•	***	•••	***	1 964			ings () (

<sup>\*</sup>The figures in parentheses indicate the rainfall for three-monthly periods; of the 339 points for the last sub-period it is worthy of mention that 31 points fell during the last three days, thereof, and had little, if any, influence upon the above figures.

The sheep-carrying capacity of the lucerne pastures for a twelve-months period ended 30th September, 1929, works out at 3.04 per acre and is a very marked improvement upon that of the natural pastures of this district, which are estimated to carry 1.5 sheep per acre.

It is intended to extend the area devoted to lucerne at this farm by about 85 acres during the next two years, the crop to be sown at 4 lb. per acre and utilised for grazing purposes.

Many farmers in the Cowra district have long since realised the value of lucerne as a grazing crop, and have already established considerable areas of this crop, but the practice has received great impetus during recent years, and it is expected that the area will be greatly increased in the near future.

#### Australian Pig Products on the English Market.

Discussing the pig industry of Australia, the Twelfth Report (Pigs and Pig Products) of the Imperial Economic Committee states: "Successful entry upon the United Kingdom market on a large scale will depend upon the ability to supply products of uniform good quality. Little has so far been done in establishing grade weights. In two States curers have agreed upon maximum weights for delivery-135 lb. (dressed weight) in New South Wales, and 125 lb. in Queensland. Payment is not made for poundage exceeding these limits. The Queensland factories also give a bonus for 'superfine' pigs, but on the whole the factories have not recognised the principle of payment for quality. It is therefore in the interests of the industry that a system of grading pigs and pig products be introduced. At any rate we suggest that as soon as a reasonable degree of uniformity in breeds is secured, the grading of pork carcases and bacon for export should be instituted. . . . The more general acceptance of a system of payment on dead weight would facilitate the introduction of grades based. not only on weights, but, ultimately, also on quality.

"Improvements and economies can also be effected in the bacon industry.
. . . Although the bulk of the bacon is tank-cured, each leading factory has its own method, some of the factories producing a fairly hard bacon, and others a bacon of a milder type. The adoption of standardised methods of curing would seem advisable. We suggest that the attention of curers, especially those who contemplate developing a connection with the British market, should be called to the importance of this subject.

"The possibility of establishing an overseas trade in mild-cured bacon hinges to a great extent on the outcome of the researches which are now being conducted with a view of overcoming the difficulty of transport through the tropics. Pending success in this direction producers in the Commonwealth might well turn their attention to the supply of frozen pork to Great Britain, though it must be admitted that there are certain disadvantages attaching to the trade in the frozen carcase; freight rates are higher than for bacon, and the market for frozen pork is at present limited and seasonal. The possibility of utilising frozen carcases for the manufacture of bacon is, however, well worthy of consideration; it should offer, in course of time, an outlet for the disposal of the surplus pig products of the Commonwealth."

# Winter Green Fodder Trials, 1929.

FARMERS' EXPERIMENT PLOTS

#### Upper North Coast.

M. J. E. SQUIRE, H.D.A., Agricultural Instructor.

The necessity for providing fodder crops for the late winter and early spring is now fully recognised by dairy-farmers in the Upper North Coast district, and greater attention is being devoted to the growth of winter cereals and legumes each year.

The following farmers co-operated with the Department in conducting trials during the past season:-

W. Mills, Roland's Creek, Uki.

W. E. Richens, Upper Burringbar.

A. Marsh & Sons, Palmer's Channel, Clarence River. M. D. O'Connell, Riverlyn, Coramba.

M. McBaron, Riverview, Raleigh.

The season was not altogether favourable to the production of heavy winter crops. The excessive wet weather in the late summer and early autumn prevented early and thorough preparation of the seed-bed and planting was also delayed. Heavy rains in the very early stages of growth caused the soil to become very sodden, and were followed at Uki and Upper Burringbar by dry conditions during the late winter and early spring. The winter was also the coldest experienced for many years.

The rainfall during the growing period at a number of centres was as follows:-

	Uki.	Upper Burringbar.	Coramba.	Raleigh.
May June July August September	190	points. 213 199 798 95 42	points.  258  770  771  120  249	points. 595 585 186 134 404
Total	1,242	1,347	2,168	1,904

The rates of seeding were as follows:—Cereals alone, 2 bushels per acre; cereals in combination with legumes, 1½ bushels, with legumes, ½ bushel per acre. The plots of cereals and legumes in combination were manured with superphosphate at the rate of 2 cwt. per acre, as the legumes give a greater response to the application of fertiliser (making more rapid growth in the early stages) than when no manure is used.

#### The Plots.

Uki.—Soil, a yellowish clay loam; previous crop, maize the previous year. Ploughed September (1928), February (1929), and May; harrowed and rolled just prior to planting. The soil was in good condition for planting, which was carried out on 28th May. Germination was good. The heavy rains in June and the dry conditions which followed were not favourable to heavy yields. Harvesting took place on 24th September. The Algerian oats were very backward owing to the dry weather, and as the land was required for other purposes arrangements could not be made for harvesting at a later date; no weights of this variety, therefore, were taken.



Buddah Oats on Mr. M. McBaron's Farm at / aleigh.

A temporary fence was erected across the plots so that portion of each plot was grazed throughout the growing period with the object of testing the palatability of the various plots and their behaviour under grazing conditions. The dairy stock did not, however show any preference for any particular plot, all being evenly grazed. During the early stages of growth the early wheats produced the best grazing, whilst the early oats came on a little later in the season and glave good results, the early wheats going off slightly as the season advanced The early oats eventually went off, and Algerian being a late oat was the last of all to continue growth. Both the French Grey field peas and Purple vetches withstood the grazing very well and made rapid growth. The vetches, however, being later-maturing than the field peas, lasted longer.

Upper Burringbar.—Soil, yellowish clay form; the area was previously an old paspalum pasture. Ploughed 10th February, 1929; harrowed and cross-harrowed 23rd February. Second ploughing 5th March, harrowed 21st

March. Third ploughing 6th April, harrowed 29th April. Planted 2nd May. Germination was very good, but the young plants were attacked by crows as they were coming through the ground, with the result that the stand was very thin. Harvested 26th September.

Palmer's Channel.—The area on which the experiment was conducted was low-lying, and became flooded with the heavy storms, with the result that the plots made very poor growth. No results were obtained.

Coramba.—Soil, alluvial; previous crop, potatoes. Land ploughed, rolled and harrowed immediately before planting on 30th April. Germination was excellent, and all plots made good growth and heavy yields were obtained. The legumes, particularly the Purple vetches, did well at this centre. The Black Winter rye, Clarendon wheat, and Grey field peas in combination were harvested on 27th August; the Clarendon wheat was then just breaking into head. However, wet weather set in and the remaining early wheats were not harvested until 16th September. By this time the early oats were also ready for harvesting. The Algerian oats were not harvested until 3rd October.

Plots were also planted on the higher, less fertile land and were used for grazing. The same results were obtained in grazing as at Uki, the dairy stock not showing any preference for any particular plot, all being grazed down evenly.

Raleigh.—Soil alluvial; previous crop, sorghum. Ploughed and harrowed just prior to planting; planted 10th May. This experiment was situated on low-lying ground, and the heavy rains checked growth considerably during the early stages. The legumes did not make any growth owing to the "wet feet" conditions. The wheats and early oats were harvested on 17th September and the Algerian oats on 2nd October.

The yields of the variety trials were as follows:-

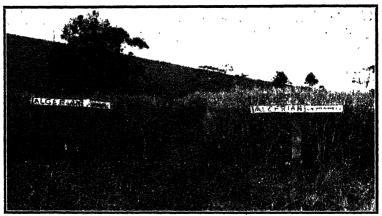
VARIETY Trials.

	A WEIGHT 1	11215.												
- 1	Place of Experiment.													
Varlety.	Uki.	Upper Burringbar.	Coramba.	Raleigh.										
Clarendon wheat Gresley wheat Barwang wheat Buddah oats Sunrise oats Mulga oats Myall oats Algerian oats Black Winter rye Clarendon wheat and French Grey field peas Clarendon wheat and Purple vetches Algerian oats and French Grey field peas	3 3 0 4 4 1 7 11 2 7 4 1 6 10 0 5 5 2 	tons. cwt. qrs 3 2 2 2 18 2 1 19 3 3 15 3 3 12 1 3 10 0 2 15 3 3 17 1 5 8 2 5 10 3 5 1 2	13 7 1	tons. cwt.qrs. 6 2 3 5 15 3 5 11 2 8 11 2 7 10 0 7 17 1 6 11 3 3 2 3 6 8 2										
.Algerian oats and Purple vetches	* ********	********	15 0 0	*******										

#### Comments.

In the wheat varieties Clarendon again gave best results and was outstanding at all centres, the fodder produced being leafy, succulent and palatable. Gresley also did well, being a little later than Clarendon. Barwang was included in the trials for the first time this season and only gave average results. It is much later than the other two varieties and only comes into head about the same time as the early oats. On account of its late maturity it is unsuitable for green fodder in this district, as the early oats maturing at the same time give much heavier yields.

Black Winter rye did very well at all centres. This crop should, however, be used entirely for grazing, as the straw is tough and unpalatable. When kept well grazed down it produces fine grass-like feed, and will make rapid growth even during the coldest wet weather when conditions are unfavourable to the growth of most crops which generally remain at a standstill. For this reason every dairy-farmer will do well to consider planting a small area of rye on his farm each year.



A Manurial Trial with Algerian Oats on Mr. W. E. Richen's Farm, Upper Burringbar.

Of the early oats, Buddah gave better results at all centros than Sunrise; it is slightly earlier than Sunrise, which also did well. Mulga gave excellent results at Coramba. The dry conditions during the early spring did not suit Algerian this season. Except at Coramba it did not do very well. At Coramba, however, the conditions were slightly more favourable, and excellent results were obtained.

The application of superphosphate to all fodder crops is advisable, as it gives the young plants a quick start by assisting them to develop a strong, vigorous, root system quickly and thus better results are obtained. Also, as previously stated, the legumes give greater response when fertiliser is applied.

One of the chief difficulties in growing winter fodders in the Upper North Coast district is that of getting the land ready for planting. The weather conditions at this period of the year are usually such that it is often impossible to do any cultivation for days. This difficulty can, however, be



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obviated to a very great extent by commencing to work the ground much earlier in the season than is usual. By doing so the soil is also brought into better condition for planting, as the heavy rains are allowed to penetrate deeper into the subsoil, and aeration of the soil is greatly assisted, with the result that better crops are obtained.

MANURIAL Trials.

	Place of Experiment.												
Crop and Fertiliser.	Uki.	Upper Burringbar.	Coramba.	Raleigh.									
Clarendon wheat; 2 cwt. superphosphate per acre Clarendon wheat; no manure Algerian oats; 2 cwt. superphosphate per acre Algerian oats; no manure	3 15 3	tons. cwt.qrs.  4 15 3 3 2 2  7 10 0 3 17 1	tons. cwt.qrs.  10 11 2 10 2 3  15 2 3 14 17 1	tons. cwt.qrs.  8 2 3 6 2 3 6 13 2 3 2 3									

With the range of crops that have been used in these experiments it would be possible to make one planting, and the difference in the maturity of the varieties would maintain a supply of green fodder throughout the winter and early spring. This course, however, is not advisable. It would be preferable to use the better varieties and make small successive plantings throughout the planting season. By planting small areas at a time in this manner the danger of growth being checked by heavy rainstorms is considerably lessened. These heavy downpours of rain do serious damage to the young plants during the very early stages of growth, and appear to make the soil sodden, with the result that the crop often remains at a standstill for some time. The later in the season that planting is carried out the less danger of damage from these storms. Planting should commence towards the end of March and continue until about the middle of May. Good crops are, however, occasionally obtained from June plantings.

#### Far South Coast and Federal Capital Territory.

JOHN L. GREEN, H.D.A., Agricultural Instructor.

THE following farmers co-operated with the Department during the past season in conducting green fodder trials with winter cereals:-

- Ing green fodder trials with winter cer P. Hoolahan, "Shannon View," Moruya. N. S. Bate, "Old Bodalla," Bodalla. W. Ringland, "Curranulla," Cobargo. C. N. Squire, "Springvale," Bega. J. Went, "Fairview," Numbugga. G. H. Black, "Belcroft," Bemboka. J. Alcock, "Webheath," Mogilla. J. S. Solomon, "Inglewood," Candelo. A. Fourter, "Model Farm," Nethercote. N. C. Neilson, "Goldenholm," Canherra.
- N. C. Neilson, "Goldenholm," Canberra. E. G. Kelly, "Jersey Farm," Canberra.

#### The Season.

Throughout the district excellent conditions obtained for sowing winter crops, as February, March, and April were all months of good rainfall.

This meant that whether the crop was sown for early feed or for hay in the spring, an excellent germination was possible. The winter was bad, being very cold and dry. The only result of this in the majority of cases was to make the crop come rather late, as sufficient moisture was present to carry on through the winter, and where the land was at all productive an excellent spring assured good hay crops. It is regrettable that in most cases in this district the land is not given a short fallow for oats, as this often means the difference between success and failure.

$R_{A}$	TN	1701	ιт	т.
LA	11	10.4	٩L	LL.

	Moruya.	Bodalla.	Cobargo.	Bega.	Bemboka.	Candelo.	Nether- cote.	Canberra.
	points.	points.	points.	points.	points.	points.	points.	points.
January	102	66	66	37	32	11	33	10
February	1,935	1,473	1,632	1,093	1,696	1,062	1,687	363
March	242	262	193	241	153	228	257	261
April	461	460	380	375	293	263	540	195
Мау	67	55	124	83	48	73	227	44
June	0	15	33	17	23	42	113	58
July	70	50	40	53	24	16	19	52
August	648	600	562	583	535	462	682	323
September	101	90	85	65	119	79	134	115
October	219	220	220	251	266	261	261	95

#### Cultural Details.

Moruya.—Soil, black alluvial flat; cropped with maize for many years. Mouldboard ploughed 5 inches on 23rd April, bull harrowed, rolled, disced, cross disced, harrowed and rolled. Wheat 120 lb., oats 100 lb., rye 120 lb., barley 100 lb. per acre, without manure, broadcast on surface, on 4th May, disced in and harrowed. Variety for manurial trial, Sunrise. This plot appeared to suffer to a greater extent than any other from the cold winter, and the yields were low for this type of land.

Bodalla.—Soil, alluvial loam; cropped with maize for three years. Disc ploughed on 6th May, harrowed twice, rolled. Sown with disc drill on 13th May, seed 66 lb. and superphosphate 112 lb. per acre. This plot gave wary good yields, harvesting being made difficult as most varieties had liberia.

Cobargo.—Soil, hill granite loam; cropped with oats and maize for five years. Disc ploughed across on 5th April, harrowed on 26th. Sown with broadcaster on 29th April, seed 90 lb.; 112 lb. superphosphate broadcast by hand. Plot harrowed.

Bega.—Soil, hill granite loam, now worn out; cropped with oats and maize for twenty-five years; last crop oats 1928. Mouldboard ploughed 4 inches on 15th February, harrowed and cultivated twice. Wheat 90 lb., oats 100 lb., barley 100 lb., rye 105 lb., superphosphate 112 lb. per acre sown broadcast and harrowed in on 27th March. Variety for manurial trial -Sunrise. The yields from the varieties, even in such a good season as the past are not sufficient to warrant cultivating this land; it is like many other hill areas-worn out.

The manurial trial was sown on adjacent land that had only been cropped for six years; this resulted in very nearly twice the yield that was obtained from the variety trial plot of Sunrise being obtained from this plot.

Numbugga.—Soil, hill granite loam, now worn out; cropped for twenty years with oats and maize; last crop oats 1928. Mouldboard cross ploughed 4 inches on 10th March, harrowed and cross ploughed 4 inches on 24th April, harrowed five times and rolled. Sown broadcast on 15th May, seed 90 lb. superphosphate 112 lb. per acre, and harrowed in. Variety for manurial trial—Sunrise oats. Here, as in the Bega trial the yields are not sufficient to repay cost of cultivation. The barleys were eaten out by hares and no yields obtained.

Bemboka.—Soil, hill granite loam, cropped with oats and maize for over twenty years; last crop oats 1928; disc ploughed 4 inches on 15th April, harrowed twice, ploughed 28th April, and harrowed. Sown with disc drill on 1st May, seed 68 lb., superphosphate 112 lb. per acre. The remarks as for the plots at Bega and Numbugga apply here. In these trials superphosphate gave an increase in yield, but no artificial fertiliser can renew the humus content of the soil. Barleys were eaten out by hares and no results were obtained.

Mogilla.—Soil, hill granite loam; cropped with oats and maize for ten years; last crop maize 1927-28; mouldboard ploughed 4 inches on 9th March, harrowed 10th March, cultivated twice and harrowed twice on 16th April. Sown on 16th April with disc drill, oats 78 lb., wheat, barley, and rye 90 lb., superphosphate 112 lb. per acre. Section of this trial was fenced off and grazed; the rye and barley did not come again; Waratah and Gresley were the best of the wheats, and Algerian the best of all the cereals.

Candelo.—Soil, fair quality hill granite loam; cropped for forty years with maize and oats; last crop maize 1927-28; disc ploughed on 15th February 7 inches; harrowed, disced, and harrowed four times prior to sowing. Sown on 17th April with disc drill, seed 66 lb., superphosphate 56 lb. per acre. Variety for manurial trial—Mulga oats. Algerian oats was the outstanding variety in this trial; it was helped by some good rains in October, and showed up well in yield. It was harvested four weeks later than the other cereals. A plot harvested at the same time as the remainder showed a yield of only  $7\frac{1}{2}$  tons per acre, but at this stage it was only peeping into ear.

Nethercote.—Soil, hill basalt loam; cropped with maize and fodder crops for forty years, last crop potatoes; mouldboard cross ploughed 6 inches deep on 2nd April, rolled, bull harrowed, disc harrowed 15th April. Sown broadcast on 16th April and harrowed in. Germination was very good, but birds pulled up 80 per cent. of the plants. The only two plots out of the fifteen sown to give results were Trabut barley and Black Winter rye. The Skinless barley in this trial made very poor growth, and was not to be compared to the Trabut.

Canberra (N. C. Neilson).—Soil, alluvial, but patches of sand and gravel; previously pasture land; disc ploughed 3 inches on 17th January, disc harrowed, fallowed until April; disc ploughed 6 inches on 1st April, cross cultivated, and soil firmed with culti-packer. Sown on 10th April with disc drill, wheat and barley 65 lb., oats and rye 60 lb. per acre; superphosphate 112 lb. per acre applied by hand. The results from the manurial trial were variable owing to the uneven quality of the land. Variety for manurial trial—Sunrise.

Canberra (E. G. Kelly.)—Soil, alluvial loam; pasture to 1927, mixed summer crops 1927-28; disc ploughed in spring, harrowed; fallowed until disc ploughed 6 inches on 28th March, harrowed and again harrowed after 3 inches of rain. Sown on 11th April with disc drill, wheat, barley, and rye 65 lb., oats 60 lb. per acre. Superphosphate 112 lb. per acre sown by hand. The yields from this plot are very good, and show a short fallow and good preparation of the land to be well worth while even on rich soil as was found on this plot. Variety for manurial trial—Buddah. Mulga, Guyra, Algerian, and Belar oats, and the manurial trial were sown on the western end of the plot, and although the soil appeared regular the yields of these plots were much smaller than those of other varieties in the variety trial. The above-mentioned varieties appeared to suffer from the cold conditions, and when inspected at one period appeared to be frost killed. Some influencing factor must have been present in the soil. The plots with no manure were more affected by frost than the manured plots.

#### The Yields.

All plots were harvested at or a little past the flowering stage. Generally Mulga, Buddah, Gidgee, and Sunrise oats, Florence and Clarendon wheat, Skinless and Trabut barley, and Black Winter rye were harvested at the one time, and about three weeks later Guyra, Belar, and Algerian oats, Firbank, Oresley, and Waratah wheat were harvested.

YIELDS of	Variety	Trials.
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															•								
		Mornva.		Bodella	- Doubles		Cobargo.		Bega.		Numbugga		Bemboka.	Mouille	arogana.	Nothomooto	TAGORIGICANO.		Candelo.	Canberra.	(Neilson.)	Canberra.	(Kelly.)
Florence Firbank Gresley		t. 8 8 6 6 5	c. 0 10 0 12 8	t. 11 11 13 15 14	c. 1 2 4 10 17	5	$\frac{2}{13}$	t. 44454	c. 0 4 9 4 19	t. 2 2 3 2	c. 4 16 10 16	t. 1 1 1 2	c. 11 9 6 16	4 5 6	c. 19 19 6 18		c.	t 6 6 4 7 5	. c. 4 9 17 15	t. 5 6 6 5 5	c. 12 10 4 10	t. 12 14 16 15	6 4 8
Oats— Gidgee Sunrise Buddah Algerian Guyra Belar Mulga		4 4 5 6 6 7	3 15 14 18 14 0	22 13 16 16 16 16	6 2 6 8 16	6 6 8 8 8	17 10 17 15 3 14	5 5 4 5 6 5 4	16 2 2 6 6 8 1	3 3 3 4 3	5 2 4 8 2 2	1 1 1 1 1	10 12 4 14 8 10	6 9 11 10 7	12 18 17 13 6 8		  	5 6 7 15 8 7	14 1 10 12 14 11 0	5 5 3 5 6 5 5	7 13 14 18 10 18	14 12 12 7 7 6 7	6 19 3 1 6 10 6
PP 1 .	r	5 4 4	1 5 5	16 17 16	19 17 18	3 4 5	3 13 8	2 3 5	17 2 6		  5		 16	6 6 7	2 5 9		10 19	5 4 6	5 19 2	6 6 5	7 13 7	12 16 13	19 19 5

YIELDS of Manurial Trials.\*

Fertiliser.	Moruya.	Bega.	Num- bugga.	Bemboka.	Candelo.	Canberra. (Neilson.)		
Superphosphate, 1 cwt. ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	5 18 6 4 6 10 7 4	tons cwt. 9 6 8 16 9 4 7 12 8 2	tons ewt. 6 6 5 7 6 7 5 2	tons ewt.  1 15 1 14 2 0 1 14 1 8	tons ewt. 8 19   8 4	t. cwt. 4 18 4 6 8 3 3 9 3 17	t. ewt.  5 8 4 17 4 17 4 17 3 18	

<sup>\*</sup> The variety used was Sunrise, except at Candelo where Mulga was used, and Canberra (E. G. Kelly) where Buddah was used.
† M 22 is a mixture of equal parts bonedust and superphosphate.

#### Remarks.

Possibly the most outstanding feature of these trials is the great variation in yields between one centre and another on the Far South Coast. All the coastal plots, received somewhere about the same rainfall, and except those at Moruya and Bodalla, were sown on hill land. Compare the results at Cobargo, where this trial was the fifth crop with the results at Numbugga or Bemboka, where the land has been cropped for over twenty years. Again compare the results of the variety trial at Bega with the results of the manurial trial on the same type of land; in the first instance the land had been cropped for twenty-five years, whereas for the manurial trial the period had been six years.

Instances are to be seen on nearly every farm where the land has been cropped for too-long a period, with the result that it has now reached a

stage where thorough cultivation and superphosphate have little effect on the yield, which remains low, because of the deficiency of humus in the soil. Most of the soils of the Far South Coast show a low humus content, and being, in the majority of cases, rather open granites, they lose what little they have rather easily when brought under cultivation. Double cropping is fatal on these soils. A common practice is that an oat crop is grown, grazed off once or twice (maybe one grazing and a cut of hay is obtained); the land is immediately ploughed, a crop of maize sown. This is either cut and fed to the cows, or if allowed to mature, the grain is harvested, and the cows put in the paddock to eat the maize stalks and any grass and weed growth. In this way every vestige of growth, be it weed or crop, is removed, and nothing is returned to the soil.

There are only two ways of maintaining the humus content of the soil. First, by periodically ploughing under some green crop, either legume or cereal. This method is more advisable on the better class land, where it is desired, owing to the limited area of such land, to keep it for cultivation. Second by laying down to grasses or lucerne. This is the method recommended, as if in the grass mixture Wimmera rye is used freely, good grazing is obtained the first year. Where possible, however, lucerne is to be desired, as it is in legumes that the pastures of this district are deficient. Lucerne should not be considered as a hay crop only, and it should not be thought that lucerne will only grow on alluvial flats. It will do fairly well on hill land which has not been previously worn out. To demonstrate this areas were sown in six different parts of this district last season, and the majority of these turned out quite satisfactory.

Of the varieties of oats grown, Algerian still retains its position of being the best all-round oat; the only other late variety to compare with it is Guyra, which yields very well and has the advantage of being a little earlier than Algerian. Gidgee, of the early oats, was the variety to surprise last season. It gave the highest yield of any variety with 22 tons 6 cwt. at Bodalla. This variety, or Mulga, or Buddah, is well worthy of being sown for early grazing or early hay. All these varieties have about the same maturity, being from four to five weeks earlier than Algerian.

Sowing a crop of Florence wheat during late February or early March for cutting and feeding green is a good means of obtaining feed during the winter. Mr. Squire, of Bega, adopted this method, and was cutting the wheat in ear during June. Barleys are not popular in this district, as they do not give the yields of green feed or hay of the oat varieties. Barleys in the young stage are the most palatable of the winter cereals; this was strongly demonstrated by the way the hares and rabbits ate the barley in the variety trials in preference to the wheat or oats.

Rye is the hardiest of the cereals, and makes quick growth, but hay made from it has very little value as feed, being very wiry.

In the manurial trials superphosphate gave profitable increases in all cases. Where the trial was sown with a drill, and the fertiliser was applied with the seed, the increased early growth was the more noticeable.

#### Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney, not later than the 12th of the month.

Wheat-... J. Parslow, "Cooya," Balladoran. Aussie ... Bald Early ... ... Manager, Experiment Farm, Trangie. ... F. Penfold, "Bluevale," Boggabri. Manager, Experiment Farm, Condobolin. E. J. Johnson, "Iona," Gunningbland. ... Canberra ... Manager, Experiment Farm, Trangie. ... F. Cornish, "Highfields," Glen Innes. Clarendon ... C. F. T. Anderson, "Swan Vale," via Glen Innes. L. G. Pryor, "Eriston," Gunnedah.
... W. Burns, "Goongirwarrie," Carcoar. ... W. Burns, "Goongirwarrie," Carcoar.
... W. A. Glenn, Thyra Road Moama.
E. J. Johnson, "Iona," Gunningbland,
W. G. Law, "Thistledown," Gilgandra.
E. H. K. King, "Karrindee," Uranquinty.
... Manager, Experiment Farm, Trangie.
... Manager, Experiment Farm, Trangie.
... Manager, Experiment Farm, Trangie.
... G. W. Forsyth, "Glencoe," Wallendbeen.
B. J. Stocks, "Linden Hills," Cunningar.
... W. G. Law, "Thistledown," Gilgandra.
J. Parslow, "Cooya," Balladoran.
E. H. K. King, "Karrindee," Uranquinty.
... C. F. T. Anderson, "Swan Vale," via Glen Innes.
... F. Odewahn, Culcairn. Cleveland ... Federation ... Florence Hard Federation Improved Steinwedel Marshall's No. 3 ... Nabawa Queen Fan ... ... F. Odewahn, Culcairn.

W. A. Glenn. Thyra Road, Moana.
E. H. K. King, "Karrindee," Uranquinty.
J. Parslow, "Cooya," Balladoran.
F. Penfold, "Bluevale," Boggabri.
L. G. Pryor, "Eriston," Gunnedah. Turvey ... Union Waratah ... ... Manager, Experiment Farm, Condobolin. E. J. Johnson, "Iona," Gunningbland. J. Parslow, "Cooya," Balladoran. J. Farsiow, "Cooya," Balladoran.
B. J. Stocks, "Linden Hills," Cunningar.
Manager, Experiment Farm, Trangie.
E. H. K. King, "Karrindee," Uranquinty.
C. F. T. Anderson, "Swan Vale," Glen Innes.
... E. H. K. King, "Karrindee," Uranquinty.
Raper and Schroeter, Calcol, Culcairn.
S. E. Nach, "Lockwood," sig Canowindra Yandilla King S. E. Nash, "Lockwood," via Canowindra.

Oats				
Belar				Manager, Experiment Farm, Trangie.
Mulga				Manager, Experiment Farm, Condobolin.
Ŭ				Manager, Experiment Farm, Trangie.
Sunrise				Manager, Experiment Farm, Trangie.
Onions-				
Improved	Hu	nter R	iver	
Brown	Spa	nish		S. Redgrove, "Sandhills," Branxton.
Early Hun	ter R	iver Wh	ute	S. Redgrove, "Sandhills," Branxton.
Hunter	Rive	er Br	own	
Spanis	h			C. J. Rowcliffe, Old Dubbo Road, Dubbo

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

#### TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.	Number tested.	Expiry date of this Certification.
W 37-7 W	44	1 Wal. 1000
W. McLean, Unanderra	ه ا	1 Feb., 1930 5 1930
Department of Education, Brush Farm, Eastwood	46	11 "
Lunacy Department, Rydalmere Mental Hospital	1977	10 1000
G. A. Parrish, Jerseyland, Berry	1 66	10 "
	1 44	100
Miss Brennan, Arrankamp, Bowral	0	01 1000
Kyong School, Moss Vale	1 4	1 Feb., 1930
A	14	1 1000
	1	10 "
G. Tabada Danis Cantanana Canthanan		10 1000
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T D Dawer Mandanah Dambulla (Casamanan)	00	74 4606
Sacred Heart Convent, Bowral	1 43	17 July 1980
Marion Hill Convent of Mercy, Goulburn	10	10 " 1000
A. Shaw, Barrington (Milking Shorthorns)	1 404	2 Aug., 1980
St. Patrick's College, Goulburn	1	1000
Walter Burke, Bellefaire Stud Farm, Appin (Jerseys)	1 20	1 "
Mittagong Farm Homes, Mittagong	Or.	90 1000
H. W. Burton Bradley, Sherwood Farm, Moorland (Jerseys)	70	4 Sept., 1930
James McCormick, Tumut	1 67	F - 4000
Walaroi College, Orange		19 , 1980
Riverstone Meat Co., Riverstone Meat Works, Riverstone	1 442	27 1980
J. L. W. Barton, Wallerswang	10	9 Out., 1980
Blessed Chanel's Seminary, Mittagong		0# 1000
H. A. Corderoy, Wyuna Park, Comboyne	1 2	1 Nov., 1980
S. G. Winkley	be.	9 1000
J. Davies, Puen Buen, Scone (Jerseys)	40	11 , 1930
Lunacy Department, Callan Park Mental Hospital	00	29 . 1980
Lunacy Department, Morisset Mental Hospital	0.7	7 Jan., 1931
Parbery, C. J., Allawah, Bega	00	7 ,, 1981
Kinross Bros., Minnamurra, Inverell (Guernseys)	70	11 , 1981
Lunacy Department, Parramatta Mental Hospital	1 00	23 ,, 1981
	1	1 " 1001

# Wheat Crop-growing Competitions, 1929.

SOME FURTHER REPORTS.

#### South-western District.

G. NICHOLSON, H.D.A., Agricultural Instructor.

In the South-western Division of the State the following agricultural societies conducted wheat crop competitions:-

Western.—Lake Cargelligo, Ungarie and Tullibigeal (Agricultural Bureau). Central Slopes.—Quandialla and Bribbaree.

Southern Slopes.—Cootamundra, Murrumburrah, Temora and Young. Riverina.—Ariah Park, Barellan, Barmedman and West Wyalong.

Of these, Mr. K. Carn, Experimentalist, Temora Experiment Farm, judged the Temora, Bribbaree, and Quandialla competitions.

The results achieved this season must be regarded as of far greater educational value when compared with those obtained in a favourable year. They clearly indicate what can be done on a limited rainfall when the best known cultural methods are combined with keen judgment and a close study of local conditions. Though the rainfall is a most important factor in crop production, good falls alone will not give maximum results; they must be accompanied by sound farming practices.

#### The Season.

The season will be long remembered as one of the driest for many years, the position being relieved only by favourable spring rains. Following on a particularly dry fallowing period, during which time little or no useful rain fell, it was anticipated that the winter rainfall would at least have been up to the average. However, such was not the case, for, apart from a short break in March and April, no further rains of any consequence fell until early in August. At many centres May, June, and July were abnormally dry, the rainfall totalling less than 1 inch, and on account of its incidence of no practical value. Isolated centres were fortunate to receive a beneficial rain in June, thus assuring reasonable growth during the winter months.

Patchy germinations and irregular growth were frequent. be traced either to too shallow sowing or to a poorly compacted seed-bed. Prospects by the latter part of July were most discouraging, but the early August rains partly relieved the position. These, however, were followed on by a rainless period of seven weeks, during which time variations in temperatures were most marked, the days being warm and windy, with frequent severe frosty nights. Once again when the outlook appeared almost hopeless beneficial soaking rains fell (at the end of September), and the crops made a remarkable recovery. Throughout this trying period it was most noticeable that crops sown under the best conditions withstood to a marked

<sup>\*</sup>Mr. Nicholson, since writing this article, has taken up the position of Manager, Experiment Farm, Condobolin.

degree the harsh season. No general rain fell during October, though isolated centres benefited by scattered thunderstorms. However, particularly mild temperatures prevailed, which was most favourable to slow ripening of the late crops. A severe frost late in October was responsible for widespread damage. Some crops were almost completely wiped out for grain, and in other cases the quality of the grain was seriously affected. The extent of the damage was not fully apparent until harvesting commenced.

RAINFALL	οm	Fallows	hre	Growing	Crops.
DAINFALL	$o_{\Pi}$	T allows	anu	CIOMITE	Orops.

Period.	Lake Cargelligo.	Ungarie.	Tullibigeal.	Quandialla.	Bribbaree.	Cootamundia.	Murrumbuirah	Temora.	Young.	Ariah Park.	Barellan.	Barmedman.	West Wyalong
Fallow (June, 1928, to March, 1929) Growing— April	Pts. 740 249 29 35 71 128 175 54	Pts. 753 123 70 156 24 274 213 6	Pts. 804 177 21 21 36 149 250 24	Pts 91 95 42 10 81 132 50	Pts 73 35 66 19 144 211 75	Pts 666 45 105 40 264 266 36 320	203 203	Pts 79 47 62 57 175 206 51	Pts. 977 65 15 111 33 175 86 259 236	Pts. 714 132 98 20 40 133 197 29	Pts. 562 197 64 13 29 169 153 53	Pts. 780 108 57 115 8 110 230 32	Pts. 723 151 100 120 24 241 216 38
Total	741	866	678	501	623	1,142	875	677	980	649	678	660	890

#### Varieties.

Twenty-two varieties were judged, which, compared with 1928, shows a satisfactory reduction of six. However, this year twelve were dropped, but six additional varieties were included, which for the two years brings the total to thirty-four. There are far too many varieties grown, and competitors would be well advised to confine their selection to those sorts recommended by the Department.

It is interesting to record that of the twenty-two varieties only eleven were successful in filling the first three places, and of these seven recommended by the Department gained 86 per cent. of the placings. The three most popular varieties were Waratah 24.8 per cent. entries, Yandilla King 20.3 per cent., and Nabawa 15.5 per cent., a total of 60.6 per cent. of the entries; these three varieties gained 64.1 per cent. of the placings.

In the early districts the outstanding variety of the season has been Nabawa. When it is considered that it is a comparatively new introduction, and therefore the area sown is limited, its success has been phenomenal. By virtue of the fact that Nabawa is highly resistant to flag smut and has proved capable of withstanding unfavourable conditions, it shows promise of being the most valuable introduction since Federation and Waratah. Brittle straw and a tendency to snap off readily close to the ground when ripe appears to be the principal defect of this variety.

Waratah, principally on account of its susceptibility to flag smut, is losing a little of its popularity. However, despite this defect and liability to shell, it has proved an excellent bag filler under all conditions, and must still be regarded as the leading early maturing wheat.

Yandilla King, a very old favourite, stands supreme for early sowing, and has proved a consistent yielder in late and early districts and light and heavy soils, provided always it is given the best treatment possible. However, the variety is best suited to the heavier types of soil and the later districts.

Of the other varieties, Penny continues to give promising results, particularly on the light and deep loams and sandy mallee soils, for which it is well suited. In the moister districts Marshall's No. 3 is popular, and has justified itself on the light, sour granitic soils.

The short-strawed, heavy-yielding grain varieties, Federation, Union. Nizam, Gallipoli, and Ranee, are particularly subject to flag smut, and should be sown with caution, for preference on fallow which has been preceded by oats, and only when the land is considered reasonably free from infection.

The following table shows the number of times varieties were entered and the number of times they occupied winning positions:—

V	ariety.			Number of Entries.	First.	Second.	Third.	Total.
Nabawa Waratah Yandilla Kir Marshall's N Penny Duri Turvey Bena Wandilla Federation Jay Wonder Gallipoli Nizam Joffre Ranee Union Currawa Bomen Champion Silver Baart Caliph	o. 3			22½ 36 29½ 5 6½ 2 12½ 4½ 10 4 2 1½ 1 1 1	4 4 2 1  1    	5 2 2 1  1     	1 4 2½ 1½ 1 1	10 81 61 22 2 2 11 1 
Major'	•••	•••	***	2			•••	•••

#### Trueness to Type and Purity.

While in most instances the type and purity of the leading crops were of a satisfactory standard, not a few competitors were content to use badly mixed and degenerate strains of seed. A crop which is not reasonably good in this respect has only a remote chance of winning a local competition, while for R.A.S. honours it is easily outclassed. It is, however, gratifying to observe that regular competitors are paying special attention to this aspect of crop production. They realise that by the use of a high yielding strain of seed, free from admixture, increased returns are possible.

Mr. K. Carn, in his report on the Bribbaree competition, remarks:—
"A wise method, and also an economic one, is to produce your own pure seed each year. A small quantity of the tried and recommended stud seed can be purchased from an experiment farm each year and planted alongside the large block of the same variety. By drilling and harvesting after the large block, with a little cleaning of the machine, strains can be kept pure and the seed is more reliable."

#### Disease.

Of the 155 blocks judged, 149 were dry pickled with copper carbonate, two were pickled with bluestone, one with formalin, and two were untreated. Bunt was more prevalent this season than usual, and it should act as a warning that pickling is always necessary. A trace of the disease was in evidence in a few of the crops, while in two instances it was rampant—one had been poorly dry pickled and the other untreated. Of late years, due to the almost universal adoption of the dry-pickling method and consequent freedom from infection, some growers have been reducing the supply of dust. Even if the seed is apparently free from bunt spores, it is of the utmost importance that the requisite amount of copper carbonate be used to assure immunity from infection. It is false economy not to pickle. Bunt infection in crops grown from dry-pickled seed can usually be attributed to careless dusting and insufficient copper carbonate.

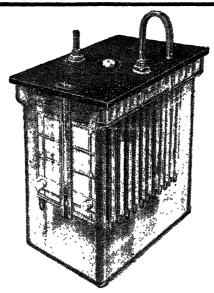
Considering that the season was one in which crops were subjected to very trying conditions, it was only to be expected that disease infection would be a serious factor. As a whole, however, crops were commendably free from disease. By far the most serious disease was flag smut. Each year, in the dryer and earlier districts, infection appears to be on the increase, but good cultural methods, rotation, and the growing of resistant varieties will keep it within due bounds. A seed bed which is poorly compacted favours the rapid spread of flag smut.

Some cases of foot rot came under notice, but infection generally could be attributed to frost damage, the disease developing after the plants had been frosted.

#### Rates of Seeding and Manuring.

The accompanying table shows the minimum, maximum, and average quantities of seed and superphosphate used by competitors in each competition:—

While heavy seeding may be regarded as an economical practice in districts of an assured and liberal rainfall such as Cootamundra and Young, it is open to question whether lighter seedings would not give better returns in the earlier districts. The principal factors to be considered are soil type, the season, variety, and time of sowing. As we have



# TYPE "SDL" TUDOR BATTERIES

TYPE "SDL" Batteries are manufactured by the Tudor Accumulator Company of London for use with Delco-Light only. These cells differ only in plate area from the largest batteries made by this firm.

The first cost of Tudor Batteries is higher than many others, but then longer life makes them much cheaper on an annual cost basis.

Tudor Batteries were chosen for use with Delco-Light, as nothing but the best can match its sterling quality.

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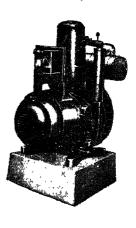
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no control over the seasons, and, moreover, as dry years are more frequent than wet ones, it is advisable to sow in anticipation of a dry season. During the past three seasons, which have been somewhat erratic, moderate seedings have proved most successful. On the light, deep loams less seed is required than for the heavy soils, since on the former germination is usually satisfactory. Moreover, the heavy soils in a favourable season can carry a denser crop. When sowing on well prepared fallow and using graded and dry-pickled seed, there should be no difficulty in obtaining a uniform and satisfactory germination. In an average year, with a lighter seeding, any lack of density will be compensated for by larger and better filled ears. However, on country known to be weed infested, heavy seeding is often an advantage, as it will assist in choking out the weeds.

The season has proved the value of superphosphate in encouraging prolific stooling and vigorous growth during the early stages. This enabled the plants to better withstand the intermittent dry spells and respond quickly to the late rains. Unmanured strips were practically complete failures. There was no evidence that liberal dressings of superphosphate caused the wheat to burn off; on the contrary, had it not been for the superphosphate, yields would have been considerably lower. Another important feature is that manuring gives rise to a healthier and more vigorous plant, which has proved to possess greater resistance to disease. Less seed and more superphosphate is recommended for districts of low rainfall.

RATES of Seeding and Manuring in each District.

Ithing	Training of Securing and Manufacting in each District.													
Seed and Surerpho-phate	Lake Cargelligo.	Ungarle.	Tullibigeal.	Quandfalla.	Bribbaree.	Cootamundra.	Murrumburrah.	Young.	Temora.	Ariah Park.	Barellan.	West Wyalong	Barmedman.	
Seed-	lb.	lb.	lb.	lb	lb.	lb.	lb.	lb,	lh.	lb.	lb.	lh.	lb.	
Minimum	45	45	5 <b>ó</b>	60	50	60	52	60	60	60	55	45	56	
Maximum	65	75	64	72	60	65	70	75	80	75	70	80	70	
Average	60	57	60	62	55	62	61	66	65	63	61	65	64	
Superphosphate—														
Minimum "	50	40	35		80	60	60	56	60	60	60	40	40	
Maximum	65	84	72	112	80	75	80	100	90	112	112	100	80	
Average	60	60	50		80	65	89	67 ·	89	80	79	65	70	
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#### Cultivation.

In spite of a most erratic season the results obtained were of outstanding merit, and must be regarded as a triumph for modern cultural methods, for it must be remembered that from July, 1928, to March, 1929, no subsoil soaking rains fell.

Outstanding crops were grown on early-ploughed fallow, which had been worked deeply in the spring. In one instance it was estimated that the difference between early and late ploughing was 80 per cent. It is apparent that any reserve of moisture stored in the subsoil was carried over from the previous autumn, when extraordinarily heavy rain fell. In this respect country possessing a good heavy clay subsoil retained the moisture to a far greater degree than the lighter loams. When fallowing was delayed until the spring, much of the moisture had escaped, the soil turned up in a most unsatisfactory condition, and as there was no rain to permit of cultivation, it was impossible to obtain a firmly compacted seedbed. Summer rains, though assisting to form the seed-bed, can rarely be relied upon to increase the reserves of subsoil moisture, and for this reason early ploughing is the foundation of a good fallow.

The rainfall is not the only factor to be considered; it is necessary to study the physical condition of the soil, with the object of producing a firmly compacted seed-bed always in view. Although cultivation plays a most important part in improving the physical condition of the seed-bed and liberating plant-food, there is ample evidence to prove that the light, deep loams can be easily overworked in a dry year. Careful cultivations, carried out expeditiously and with the machine in perfect adjustment are the workings which count most. If an implement is strained it cannot do satisfactory work or give good results. It is significant that the leaders in the crop competition field always make a point of seeing that their machines are kept in good order.

Faulty germinations were by no means uncommon and could be traced to two main causes, viz.: (1) A poorly compacted seed-bed and irregular depth of mulch, and (2) sowing too shallow with the combine out of adjustment. If, in a dry year the seed-bed is compacted and contains a percentage of moisture, it is sound practice to sow deep, particularly on the light soils. Another frequent cause of faulty germination was sowing with the combine and using broad points. The points overlap and lift the seed already sown from off the seed-bed and scatter it through the dry mulch. For preferance all narrow points should be used, but if necessary for weed destruction, broad points should be fitted only to the two front rows.

#### North-western District.

#### J. A. O'REILLY, H.D.A., Agricultural Instructor.

Practically every section of the wheat-growing areas in the north-west was represented in the field wheat competitions this year. Besides the P. and A. Associations at Gunnedah, Narrabri, Wee Waa, Moree, and Inverell, branches of the Agricultural Bureau at Delungra and Boggabri conducted competitions. The number of entries was maintained, and interest in this phase of the work has reached a very high pitch. A slight falling off in the

number of entries was noticeable at Narrabri, where seasonal conditions on the whole were good. Twenty-four entries at Inverell constituted a record since the competition has been inaugurated there; a 36-bushel average of the crops inspected gives some idea of the improved farming methods adopted, the congenial seasonal conditions, and the potentialities of the Inverell district. The initial effort of the Myall Creek Agricultural Bureau (Delungra) was a worthy one; eleven entries were received, and the winning crop there secured fourth place in the championsip.

RAINFALL at the Various Centres.

	Gunnedah Post Office.	Curlewis (J. Cavanagh)	Kelvin Post Office.	Boggabri.	Boggabri.	Boggabri (C. Abbott.)	Narrabri Post Office.	Turawan. (R.J McWilliams)	Moreo Post Office.	Moree (J. McDonald).	Wee Waa Post Office.	Inverell Post Office.	Bingara Post Office.
January February March	533 56 234 28 57 76 190 97 84 195 61	Pts. 72 302 31 216 3 18 57 176 90 77	Pts. 132 607 80 201 13 148 65 230 109 154 180 82 2,001	Pts. 66 308 75 248 26 92 62 179 88 98 1,242	Pts. 66 308 75 248 26 92 62 179 88 133 97	Pts. 20 175 55 310 15 110 113 210 92 144 105	Pts 688 11 181 107 149 118 225 1,479	Pts. 72 306 49 425 119 64 142 67 101 1,345	Pts 163 515 35 32 61 160 129 245 1,340	Pts. 190 248 234 401 71 41 145 53 200 1,583	Pts. 59 233 36 554 117 61 80 69 82 1,292	Pts. 93 493 233 467 29 104 66 195 124 472 2.276	Pts. 109 661 133 631 131 74 416 201 312 117 2,785

#### The Season.

Up till the end of May, 1929, the conditions throughout the north-west were similar. The December-January period was the driest on record, but this condition was changed by useful rains in February. These rains enabled farmers to plough any land which had not been touched since harvest. March finished up comparatively dry, but at the beginning of April substantial falls were received throughout the district—from 21 inches at Gunnedah to 5 inches at Inverell and 7 inches at Narrabri. The seeding month of May was particularly dry, and in those sections of the district which did not receive good rains in June the germination of the crops was patchy and retarded till rains were received in August. The incidence of the rainfall in April and May presented a difficult problem regarding the time of sowing. Generally throughout the north-west mid-season and early varieties are mainly used, and the rains of early April, whilst making conditions suitable for the sowing of late maturing varieties, proved too early for mid-season and early varieties. Despite these good rains in April, the germination of May-sown crops was patchy. The rapidity with which the soil dried out was probably due to an exceptionally dry atmosphere after cessation of rain. The winter months proved dry and frosty, and early varieties sown in April were badly frosted when from 9 inches to 1 foot high. The heads which were already formed in the plants were damaged to such an extent that, only for the useful rains in August, which promoted a second growth, these crops would have been doomed to failure. These frosted crops would probably have been improved by feeding off, but this practice was out of the question owing to an almost complete absence of the permanent rooting system through lack of rains after sowing.

It has been said that up till the end of May conditions were somewhat similar throughout the district. Early in June rain was received in varying amounts of 57, 92, 181, 117, 32, and 104 points at Gunnedah, Boggabri, Narrabri, Wee Waa, Moree, and Inverell respectively. These rains materially enhanced the prospects at Boggabri, Narrabri, Wee Waa, and Inverell by germinating May sowings and developing the rooting system of April- and early May-sown crops. When rain was received at the end of July and the beginning of August, crops (at Gunnedah particularly) had a lot to pick up, whilst crops in those sections of the district which participated in the useful falls in June were brought to a successful issue by light falls later in the spring.

#### Cultural Details.

Of the eighty-two crops entered in the competitions, six only were grown on winter fallow. The north-west is unique in respect of being able to produce payable crops on a well-prepared, short summer fallow.

The number of times the fallows were worked was as follows:—Gunnedah 3.3, Boggabri 3.3, Narrabri 3.3, Wee Waa 2.4, Moree 3.6, Inverell 3.4, and Delungra 2.4 times.

The rainfall from December, 1928, till May, 1929, had some influence on the number of cultivations and time of the initial working. The weather during December and January remained dry, and many farmers were loth to burn the stubble owing to a probable shortage of feed. The question at the time, when the soil was comparatively dry, was whether any benefit would be derived from giving the initial working before rain. Even though the soil be dry for a foot from the surface, evaporation is progressing all the time, and if the soil is in such condition as to enable it to be worked, the surface should be broken to increase the depth of mulch and leave the soil in a more suitable condition to absorb moisture.

It is interesting to note that the majority of the fallows which produced the leading crops received the initial working prior to the February rains. This indicates that the working of the soil as soon after the harvest as possible is an important factor in the production of better crops in this district. The fallows were not worked frequently, as the stock were able to cope with the weed growth, and no difficulty was experienced in maintaining a suitable mulch. In many cases the initial working was given with the springtooth or rigid-tine implement, and the resultant crop was quite satisfactory.

#### Varieties.

Twenty-one varieties were used in the competitions, and whilst Waratah occupied pride of place, it did not form such a large proportion of the

entries as was the case last season. Cleveland and Queen Fan figured largely in the Inverell and Delungra competitions.

The	following	table	shows	the	varieties	used	and	their	placings:-

	Variety.			Number	Number of Placings.							
, v				of Entries.	First.	Second.	Third.	Total.				
Waratah Cleveland Queen Fan Canberra Marshall's N Currawa Wandilla Gluyas Earl Aussie Hard Federa Clarendon Sunset Bobin Turvey Rymer Pusa No. 4 Yandilla Kin Duri Nabawa	 y ution  			29873333221111 1111111111111111111111111111	4 1 ½ ½ ½ ½ ½ ½	2 1 1  1  1  1 	2½ 1 1 1 1	8½ 2 1½ 1½ 1½ 1½ 1 1½ 2 1 1				
Florence Quality		•••	•••	3				•••				

#### Seed and Manure.

The average rates of seeding at the various centres were as follows:—Gunnedah 47.4 lb., Boggabri 52.7 lb., Narrabri 47 lb., Wee Waa 48.8 lb., Moree 49.4 lb., Delungra 48 lb., and Inverell 56 lb. per acre. The rate of seeding very rarely exceeds 60 lb., and in some cases as low as 35 lb. per acre is used. The average rate is from 40 to 50 lb. per acre.

As a fungicide for the prevention of bunt, copper carbonate was the mostly widely used. Formalin was used in one case and a proprietary fungicide in another. Eight crops were sown with untreated seed, and in one particular instance the infection of bunt was heavy. Bunt is becoming less and less troublesome, consequent on the use of copper carbonate as a preventive, but farmers would be wise not to neglect treating the seed, and to make sure that the work is carried out efficiently.

Of other diseases, foot-rot was probably the most noticeable; particularly was this the case at Inverell and Delungra. Flag smut, whilst appearing in most of the crops, was not in sufficient quantity to affect the yields materially. Conditions suitable for the development of rust obtained for a period during October, but later drier conditions saved several crops which might have been damaged by this disease.

Superphosphate at the rate of from 35 to 50 lb. per acre was sown with four crops in the Wee Waa competition. It is evident from this that the use of superphosphate is not regarded as an essential factor in the production of wheat in the north-west.

### Eastern Riverina.

G. C. BARTLETT, H.D.A., Senior Agricultural Instructor.

FIELD wheat competitions were conducted in the eastern portion of the Riverina by the P. and A. Associations of Albury, Corowa, Wagga, Henty, Culcairn, Lockhart, and Coolamon, by the Farmers and Settlers' Association branches at The Rock and Yerong Creek, and by Agricultural Bureau branches at Munyabla and Bidgeemia. The fact that so many associations conducted competitions under the most difficult seasonal conditions is indicative of the value placed on this method of agricultural education. In the Riverina there are many centres which do not possess a P. and A. Association, but the Farmers and Settlers' Association branches in those districts are conducting the competitions with marked success, and it is interesting to see one or two branches of the Agricultural Bureau now strong enough to conduct their own competitions.

The following entries were obtained at the various centres:—Albury, 16; Corowa, 13; Culcairn, 14; Henty, 12; Yerong Creek, 15; Munyabla, 14; Bidgeemia, 10; Lockhart, 14; The Rock, 16; Wagga, 26; and Coolamon, 18.

The seasonal conditions were the most severe experienced for some time, and coming on top of the two previous abnormally dry seasons, there was no reserve in the subsoil and the crops and farming methods were tested to their utmost. There was a good break in the first week in April which enabled much-needed working of the fallows to be carried out and seeding to be proceeded with straight away. However, there was no further rain of a beneficial nature until the end of September. The winter was not only very dry, but was accompanied by many severe frosts, including one as late as the 22nd October.

The crops that were sown early came away fairly quickly with a good germination, also those that were sown moderately deeply. In both those cases most advantage was taken of the April rain in the seed-bcd. Some of the crops that were sown late or very shallow, especially on the heavy country, did not show above ground until August.

The rainfall for the year up till the 22nd December ranged from 9 to 15 inches, while that on the crop ranged from but 4 to 9 inches. Most districts up till the end of the period when the falls were of benefit to the crops had only received about half the average rainfall.

Most of the crops contained second or late growth resulting from a break at the end of September, and a good many displayed a "haying off" condition, and uneven ripening. The following were the average yields of the various districts:—Albury, 31½ bus.; Hentry, 29½ bus.; Culcairn, 29½ bus.; Munyabla, 27 bus.; Wagga, 26 bus.; The Rock, 25 bus.; Lockhart, 24 bus.; Corowa, 23½ bus.; Coolamon, 23½ bus.; Yerong Creek, 23½ bus.; and Bidgeemia, 17¾ bus.

### Cultural Methods.

The crops that produced the heaviest yields of the district were mouldboard ploughed 4½ to 5 inches deep in June and July, and were harrowed and worked thoroughly and deeply before harvest and twice after harvest before sowing. The value of taking advantage of every opportunity was proved in a most marked manner.

The scarifier was the principal implement used in cultivating the fallows in 60 per cent. of the crops securing the first three places in all the districts. This implement is now widely adopted and is giving good results. The four best crops of the district and several other placed ones were grown with power farming. It is a distinct advantage when ploughng, working the fallows, or sowing, to do the job at the right time and to get it done quickly.

Farmers are finding power plants very useful for this purpose. This is especially the case with the duckfoot Wimmera scarifier, which is a heavy implement to work, but which in most cases puts a fallow in good order for seeding, and in working cuts practically all weeds, and leaves the ground in such a condition that it will hold for a long period in good order.

### Seeding.

Many farmers try to vary the time and depth of sowing to suit seasonal conditions. This was especially the case this year. It does not seem wise to delay sowing for more than a week beyond the time found to suit the variety.

Shallow sowing was in many cases found to give unsatisfactory results. Where the seed-bed was firm and moist, the wheat sown down on that depth mostly gave good results.

Shallow sowing should only be practised where the seed-bed is loose or dry.

The rate of seeding has been steadily on the increase for some time, and is now found to be on the maximum to give best results. Several cases of heavy seeding with the later maturing varieties (80 lb. and over to the acre) were seen to give inferior results. Better seed-beds, together with the dry method of pickling are giving better germination results, and it is thought that 65 lb. of good seed per acre now is equal to 80 lb. under the old system. In most cases 65 lb. with the late maturing varieties and 75 to 80 lb. with the early maturing varieties gave the best results.

# Manuring.

The quantity of superphosphate used has been steadily on the increase in recent years with beneficial results; the higher standard fallows have responded to more manure to advantage. On the other hand heavy manuring on inferior fallows is rather a disadvantage. It is essential that cultural methods come first. The leading three crops in every district were manured with from 90 to 112 lb. per acre. It can now safely be said that superphosphate does not burn a crop off, as is still believed to be the case by many.

If the fallow is in good condition the manure develops a larger rooting system, resulting in a more vigorous plant, better able to withstand both

disease and dry conditions, and resulting also in better-filled grain. Evidences of this influence was seen in the competitions. Even heavier applications than were applied do not have deleterious effects on the better class of fallows, but it becomes a question of whether the increase is obtained at a profit.

#### Diseases.

Flag smut was found to be abnormally prevalent. This disease is usually worse in a dry season, but when cases are seen (and several such occurred in the competitions) where losses amount to 30 per cent., the position must be regarded as very serious. Foot-rot and take-all were also present to more than a desirable degree.

Nearly 90 per cent. of all the crops this year were sown with seed that had been dry pickled and bunt or ball smut was practically non-existent. It was found in one case, but only in a very minor degree. There was a little loose smut generally in every district, but not enough to cause concern.

### Trueness to Type and Cleanliness.

The need for attention to the seed purity is apparent in the Albury, Yerong Creek, Henty, Munyabla, Culcairn, and Bidgeemia districts, while the Lockhart and Corowa districts displayed a good type of seed. Wild oats and saffron thistles are still causing trouble, and the scarifier seems to be the best implement for their control. Summer fallowing was also of great assistance.

### Varieties.

There was a big reduction in the number of varieties grown this year, which is rather a good sign. As an example, last year Wagga exhibited forty-one and this year only twenty-eight varieties. It is thought that this could be still further reduced with advantage. It is unwise to sow the bulk of the crop with one variety, but most desirable to limit the number to a maximum of, say, two late, two mid-season, and two early proved sorts. On the average this distribution is generally the most profitable. The varieties Nabawa and Yandilla King stood out; Turvey and Warath also did very well even under the driest season on record. Yandilla King produced the heaviest yielding crop of the Riverina.

The following are the numbers of places secured by the various varieties:—

Variety,	1st Place.	2nd Place.	3rd Place,
Yandilla King Nabawa Turvey Penny Waratah Union Marshall's No. 3 Federation *Wandilla	4 4 2 1  1	6 1  31 1 	3 11 1 3  3 1

<sup>\*</sup> Only secured a place in conjunction with another variety.

### Western Riverina and Yanco.

### H. J. DARGIN, Agricultural Instructor.

Wheat growing competitions were conducted by five agricultural societies, viz., Narrandera, Oaklands, Berrigan, Deniliquin and Yanco, in the western portion of the Riverina during last season.

At the Yanco-Leeton end of the Irrigation Area the first competition held for wheat grown on irrigated land was organised by the Yanco Agricultural Society. This society is to be congratulated upon its effort to encourage better farming methods under irrigation. Large areas of wheat, grown in rotation with rice and other cereals, are now being grown under irrigation, and in the future the society hopes to make this area a nursery for pure seed supplies for the whole of the Riverina and possibly other parts of the State. This can only be done by the growers procuring selected, pure, true to type seed early in the year and not by leaving such a vital matter until just prior to sowing, as at such a time it is practically impossible to secure the best class of seed of many of the popular varieties.

For the third year in succession droughty conditions were experienced in these centres. The 1929 season was an extraordinary one, heavy rains saving the situation at the end of August and in early September, and cool conditions occurring right up to harvest time with a number of late frosts. In all five districts heavy rain fell during April, falls of from  $2\frac{1}{2}$  to 3 inches being recorded, but from the 1st May to the end of October the rainfall in each district was as follows:—

						inches.
Narrandera	•••		•••	•••	•••	4 to 43
Oaklands		•••	•••	•••	•••	5 ,, 6
Berrigan	•••	•••	•••	•••	•••	$4\frac{1}{2}$ ,, 5
Deniliquin	•••	•••	•••	•••	•••	4,,5
Yanco	•••	•••	•••	•••	•••	4½ ", 5

During the months of May, June, July and August only a few light scattered showers of rain fell. From 2 to  $3\frac{1}{2}$  inches of rain fell at the end of August and in early September, but prior to this late rain many crops were in a decidedly bad state. Fortunately a large number of crops made a surprisingly good recovery during September and with the assistance of the long cool season, grew into nice crops and well headed plants which contained full, plump grain, and some heavy yields far beyond expectations were harvested. The average yields of the competition crops were as follows:—Berrigan,  $23\frac{1}{2}$  bushels; Narrandera,  $22\frac{1}{2}$  bushels.; Oaklands, 21 bushels; Deniliquin, 16 bushels.

#### Cultural Details.

The fallows were in good condition in most of the districts at time of sowing, and generally germination was all that could be desired. Unfortunately in some crops a large number of plants faded away to nothing during the dry spell. The Deniliquin district suffered most in this direction, possibly owing to the loss of moisture through the powdered condition of the surface soil on a number of farms, which was brought about by

the continual use of disc implements. A greater number of farmers here are now using mouldboard ploughs and tined implements and they are well satisfied with the improvement in the work being done by them.

Early ploughing in June and July was adopted by over 80 per cent. of the farmers. Eleven of the twelve placed crops in the districts other than Yanco were ploughed during these months, while on the Irrigation Area the winning entry was ploughed during August, which was three months earlier than the second and third placed crops in this competition.

The average number of times the fallows were worked in the districts other than the Irrigation Area was five, while several received up to eight workings. In every instance sheep had been used to keep the fallows free from weeds.

The number of crops judged were:—Narrandera 17, Oaklands 21, Berrigan 17, Deniliquin 21, Yanco 12; total, 88. There were twenty different varieties included in this total. Yandilla King with twenty-two entries was the most popular variety; Federation which was the favourite variety last season, took second place with 14½, while Nabawa, which is quickly gaining favour throughout these districts owing to its resistance to flag-smut and its bag-filling qualities under droughty conditions, was next on the list with 13½ entries. There were only 3½ entries of Waratah which was the favourite wheat in these parts of the Riverina a few years ago; it is not now grown to such an extent owing to its tendency to shell.

The following table shows the relative popularity of the varieties and their success in this year's crop growing competitions:—

Variety.	Total	First.	Second	Third
	Entries.	Place.	Place.	Place,
Yandilla King Penriy Nabawa Federation Canberra Bena Waratah Turvey Ranee Marshall's No. 3 Rajah X.B. (Victorian) Free Gallipoli Carraban Union Wandilla Nizam Bomen German Wonder Hard Federation Framer's Friend	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

### The Seed Used.

Considerable attention should be given to purity of seed throughout Western Riverina as during the past three years, owing to seasonal conditions, the required quantity of pure seed does not appear to have been available. Of the eighty-eight crops judged, only six were fit for seed purposes and received the required number of points (eighteen) for trueness to type and purity, and five of these were in the Narrandera district. The remaining eighty-two crops either showed signs of running out badly or contained a number of strangers.

In every instance the seed had been graded, and the dry (copper carbonate) method of dusting the seed for the prevention of bunt or ball smut was adopted in eighty-seven out of the eighty-eight crops judged, the one remaining farmer having treated his seed with bluestone. This particular crop was rather badly affected with bunt.

The numbers of competitors who used the various quantities of seed per acre in the five districts were as follows:—

District.	45 lb. per acre.	50-56 lb. per acre.	60-65 lb. per acre.	70-75 lb. per acre.	80-851b. per acre.	90 lb. per acre.	No. of Entries.
Narrandera Oaklands Berrigan Deniliquin Yanco	2   	1  1 3 	5 10 5 17 8	9 8 8 1 2	 2 3  2	 1  	17 21 17 21 12
Total	2	5	45	28	7	1	88

Of the fifteen placed crops in the competitions, nine were sown at the rate of 60-65 lb. of seed per acre, four at 70-75 lb. per acre, and two at the rate of 80 lb. per acre.

Farmers who are finding it a difficult matter to obtain supplies of pure seed for next autumn's sowing of any variety which they may require for their particular type of soil or locality, would be well advised to procure even half a dozen bags of the best seed and in this way gradually work up a supply for future use on their own properties.

### Superphosphate.

The following table shows the numbers of crops to which various quantities of superphosphate were applied per acre in each of the districts:—

District.	Nil.	40-45.	50–56.	60-65.	70–75.	8085.	90 <b>–100</b> .	115.	No. of Entries.
Narrandera Oaklands Berrigan Deniliquin Yanco	  2	 1 6 1	2  3 1	2 5 4 7 5	9 7 6 2 4	2 2 5 	1 5  1	1 2 1 	17 21 17 21 12
Total	2	8	6	23	28	9	8	4	88

This year 55.6 per cent. of farmers applied 70 lb. of superphosphate and upwards. These figures show a tendency towards heavier applications, as last year 47.1 per cent. were in favour of applications at the same rates.

### Diseases and Weeds.

A number of the crops were affected by foot-rot, while in four a trace of bunt or ball-smut was found. One of these was the only entry, the seed of which had been treated with the wet bluestone pickle, and two of the remaining three entrants had been dissatisfied (prior to sowing) with the obviously insufficient dusting which had been given their seed by grading and dusting contractors' machines. Farmers should take great care that the machine used is dusting their seed evenly, and that the full amount of 2 oz. of copper carbonate to 1 bushel of wheat is being used.

Flag-smut was much in evidence throughout the competitions, but not nearly to such a large extent as last year. The improvement in this respect is no doubt due to the number of competitors who had sown varieties showing resistance to flag-smut, principally Nabawa, on land which had become infected with the spores of this fungus. Loose-smut again made itself felt in a number of crops, but was not as bad as last season.

Stem rust was prevalent in several of the districts, and was particularly bad throughout the Yanco irrigated wheat competition, but it did not appear to affect the yields in any respect, possibly owing to having developed so late in the season.

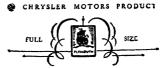
Large quantities of wild oat, saffron thistle, and wild mustard were present in a number of crops grown on old cultivation land, while in one instance skeleton weed was found affecting the yield of the crop.

### AVOID PACKING WARM FRUIT.

An important matter that should receive attention from every fruit-grower is the packing of what may be termed "warm" or "hot" fruit. Very often the fruit is warm when picked, and is then packed into hot cases before it is given a chance to cool down. After packing the cases are put into a stack in a hot shed, and later into a railway truck, the inside temperature of which may be anything up to 100 deg. Fah. upon its arrival at the ship's side. During the 1928 export season the temperature of many individual apples was taken at Port Melbourne as soon as they were taken out of the louvred trucks, and it was found that in some instances it was as high as 85 deg. Fah.; a temperature of 70 deg. Fah. was quite common. It goes without saying that there is very little hope of such apples arriving in good condition at the other end of the world. It is most advisable to have the fruit picked some time before packing. so that it may have an opportunity to cool off. If this were done much loss would be avoided.—J. M. WARD, in the Journal of Agriculture of Victoria.



# What the



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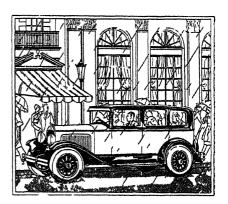
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# Early Potato Trials, 1929.

FARMERS' EXPERIMENT PLOTS ON THE CENTRAL COAST.

J. DOUGLASS, H.D.A., H.D.D., Agricultural Instructor.

EXPERIMENTS with early potatoes were planted out in the Hunter and Hawkesbury districts last year with the objects of (1) ascertaining the source of, and the most suitable variety or strain of early potato to grow on the Central Coast, and (2) the effect of artificial fertilisers on potatoes.

The year was a most favourable one, for a comparatively dry winter enabled the land to be thoroughly prepared and planting to be carried out under ideal conditions, and a comparatively wet season was experienced which did little damage on farms out of flood reach. Unfortunately, two very disastrous floods were experienced on the Hunter and Hawkesbury, which did great damage to the potato crops on low country. Experiments at Hinton, on the Hunter, and Pitt Town Bottoms, on the Hawkesbury, were completely destroyed. Very late in the season practically the whole of the crops were attacked by Irish Blight, which, however, only destroyed the plant tops. The spell of dry westerly winds prevented further damage, and the only effect was that the yields were slightly reduced owing to the defoliating effect of the blight. It was found that early varieties, being more matured, were not so badly damaged as late varieties carrying heavy green foliage.

# The Variety Trial.

The following yields were obtained in the variety and strain trial conducted on the farm of Mr. A. McKimm, Bolwarra, West Maitland:—

Variety and		Yield.						
					t	ons.	owts.	ars.
Up to Date (John's)		•••				8	11	2
Early Manistee (Cusack's)	•••			•••		6	1	2
Early Manistee (McPaul's, Taralga)				•••		5	14	0
Factor (Wright's)						5	13	3
Satisfaction (Howard's, Taralga)		•••				5	1	3
Factor (Barberie's)		•••				4	17	2
Tasmanian Brownells (Frost's)						3	10	3
Satisfaction (Starr's)	•••	•••	•••	•••	•••	2	13	Õ

The destruction of the two other variety trials by flood robbed the experiments of a good deal of interest. They were, however, a great object lesson to all potato-growers, for the seed-grower was known in every case, and comparisons could be made on the farm.

It has been found that the selection of variety to plant is not as important as the source of the seed. Pure seed growers who carry out selection work are the men from whom to buy the seed. Many tableland growers fail to recognise plants affected with virus disease or strangers, and fail to remove them from the crop, and this, of course, results in an increase of the trouble

Unless strict selection work is carried out, degeneration (run out) takes place rapidly, resulting in decreased yields. A certain strain in the trials at Mr. McKimm's farm had over 50 per cent. of the plants affected with virus, and came well down the list as a yielder; three seasons ago this strain was the heaviest yielder. This state of affairs has been brought about by the rapid "run out" of the strain. It is found that on the coast potatoes always have a greater percentage of diseased plants than the original crop on the tablelands. It will therefore be of interest to seed-growers to obtain particulars of this phase of the work.



A Crop of Mr. McPaul's Factors.

Grown on the farm of Messrs. Kershaw and Scoble at Macquarie Fields. Note the uniformity of the crop.

### Notes on the Varieties.

 $U_p$  to Date (John's), which produced the highest yield under trial, was an excellent sample of the variety. Only 5 per cent. of disease was noticed throughout the plot, which was very uniform both as regards top growth and sample of potato produced. The plants produced a number of large uniform potatoes of high quality. This variety is very similar to Factor.

Early Manistee (Cusack's strain) had only a percentage of virus plants. This variety has a finer leaf than Factor, and produced light pink coloured tubers of good size and excellent quality. Early Manistee is a superior eating variety to Factor, and is an earlier maturer. Coastal growers could be well advised to plant early an acre or two of this variety for the very early market. Growers who favour Early Rose should be very pleased with Early Manistee.

Early Manistee (McPaul's).—This was an excellent strain of the variety, but contained slightly more virus, which accounted for the slightly lower yield.

Factor (Wright's).—This strain of Factor is superior to what the results of the trial indicate. The variety has given excellent results in other years. Mr. Wright's strain was particularly uniform, of outstanding growth throughout, but appeared to be effected badly with blight. Although the tubers were not affected, the tops were destroyed while still green, resulting in the decrease of the yield.

Satisfaction.—Howard's strain of this variety has always produced a heavy yield under all conditions. This crop only contained about 6 per cent. of virus and was very uniform throughout. Coastal growers who plant this variety can be well advised to obtain this strain.

### Comparisons of Commercial Areas.

Comparing commercial areas is not a very satisfactory method of testing varieties, but owing to the flood damage to the plots, was resorted to this season. Comparisons were difficult to make, but the conclusions drawn were:—(1) That Factor is the best-yielding and most satisfactory potato to grow under central coastal conditions. Mr. Flood's strain produced excellent results under all sorts of conditions on the Hawkesbury, but unfortunately was not under test on the Hunter. At Maitland Mr. McPaul's Factor has for several seasons given excellent results, and can be recommended for that district. (2) Mr. Howard's Satisfaction is a very heavy-yielding strain; under commercial conditions on the Hunter it yielded over 9 tons per acre.

The following yields were obtained on commercial areas on the farms of two of the experimenters:—

#### Mr. A. McKimm, Bolwarra, West Maitland.

			Y	ield.						
		•					tons.			
Factor (McPaul's, Taralga)	•••	• • •	•••	•••		•••	10	0	3	
Satisfaction (Howard's, Tara	lga)				•••	•••	9	1	3	
36 38	. D	D:44	TT	Dattaman	XX73	3				,
Messrs. May	Bros.,	Pitt	Lown	bottoms,	WII	asor.				
Factor (J. Flood's)	•••	•••		•••	•••		8	17	2	
Factor (Howard's, Taralga)	•••		•••	•••	•••	•••	7	12	0	

### Manurial Trials.

The only manurial trials harvested were at Maitland on Mr. McKimm's property. The yields were as follows:—

#### No. 1 Trial (Starr's Satisfaction).

	Fertiliser.									
*	ı									
Superphosphate (2½ cwt per	acre)	•••	***			•••	3	14	1	
M 22 (21 cwt per acre)		***		<b>`</b>	***		3	11	0	
No manure	•••	•••	•••	***	***	• • •	2	13	0	

The use of  $2\frac{1}{2}$  cwt. of superphosphate produced an increase in yield over the unfertilised plot of 1 ton 1 cwt. 1 qr. per acre. With potatoes valued at £8 per ton and superphosphate at £6 per ton, this increase represents a net profit of £7 15s. per acre.

	No. 2	? Trial	(Starr	's Satis	faction	ι).			
			Fertili			7-	Υi	eld	
							tons.	cwt	. qrs.
Superphosphate (28	0 lb. per	acre)					 5	6	o
P 11 (330 lb. per ac	re)		•••		•••		 4	1	3
P 13 (383 lb. per ac:	re.)		•••		•••		 3	13	3
No manure	••••						 3	12	1

In this case superphosphate showed an increased yield of 1 ton 13 cwt. 3 qrs. over the unmanured plot. When potatoes and superphosphate are valued as above, the increased net return is £12 15s. per acre.

Artificial fertilisers are in general use on the alluvial flats at Windsor.

### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36a, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

#### 1930.

Bowraville (A. H. Newman)	Mai	. 4, 5.	Campbelltown (R. A. Sidman) Mar. 28, 29.
Tumut (M. Archer)		4, 5.	Gresford (A. R. Brown) , 28, 29.
Inverell (E. A. Clarke)		4, 5, 6,	Dungog (W. H. Green) Apr. 2 to 4.
- 12 T T T	•	5, 6.	
	,,	5, 6, 7.	Goulburn (Major Harris) ,, 3, 4, 5.
	• • • •		Goulburn (Major Harris) ,, 3, 4, 5.
Maitland (M. A. Brown)	. ,,	5 to 8.	Muswellbrook (R. C. Sawkins) ,, 9, 10, 11.
Wallamba (E. A. Carey)	٠,,	6, 7.	Sydney Royal (G. C. Somerville) , 15 to 26.
Moss Vale (W. Holt)	. ,,	6, 7, 8.	Orange (G. L. Williams) May 6, 7, 8.
Mendooran (A.F. McKillop)	. ,,	7.	Grafton (L. C. Lawson) ,, 7 to 10.
Rydal (H. Murray)	. ,,	7, 8. 11, 12.	Casino (E. Brallis) ,, 20,21,22.
Gundagai (P. J. Sullivan)		11, 12.	Trangie (F. H. Hayles) June, 3, 4.
Macksville (George Hughes)		11, 12.	Narrandera Sheep Show (J. D.
Tumbarumba (M. Kinstler)	• • •	11, 12.	Newth) July, 15, 16.
Malana (W. D. Chamaan)		11, 12.	Contomination Chair Chair
372 L.J Ct 'YY YF17 1.L		12, 13.	Vanna Cham Cham (M. ) Mantan) 20 01
		10 10	Toke Caracilian
Dorrigo (J. H. Skeoch)		12, 13.	Lake Cargelligo Aug. 19, 20.
Cooma (G. E. Metcalfe)	. ,,	12, 13.	
Wauchope (T. Suters)	. ,,	13 14.	Grenfell ,, 26, 27.
Mudgee (O. Wilkins)	. ,,	13, 14, 15.	Ungarie ,, 27.
Bowral (E. Waine)	. ,,	14, 15.	Wagga (F. H. Croaker) ,, 26, 27, 28
Stroud (C. E. Price)	. ,,	14, 15	Junee (G. W. Scrivener) Sept. 2, 3.
Penrose C. E. Brien)		15.	West Wyalong 2.3.
Bellingen (J. E. Reynolds)		18, 19.	Murrumburrah ,, 2,3.
Gulgong (T. Amies)		18, 19.	Boorowa ,, 4,5.
Bombala (P. J. Jonas)		19, 20.	Commo
Taree (C. A. Jackson)		19, 20, 21.	Downedman
C	•••	21, 22.	The same of the sa
		21, 22.	
		01 00	Donallan
Bullahdelah Agricultural Burea	u ,,	21, 22.	Barellan ,, 24.
Wingello (J. E. Creelman)	. ,,	22.	Ardlethan Oct., 1.
Batlow (C. S. Gregory)	. ,,	25, 6.	Quandilla ,, 1.
Blayney (W. Ware)	. ,,	25, 26.	Hay (George C. McCracken) , 1,2.
Tamworth (E. E. Upjohn)	. ,,	25, 26, 27,	Narrandera (J. D. Newth) ,, 7, 8.
Warialda (C. S. Pyke)		26, 27.	Bribbarec , 8.
Young (T. A. Tester)	• • • • • • • • • • • • • • • • • • • •	26, 27.	Ariah Park , 8.
Kempsey (E Mitchell)	.,	26, 27, 28.	Griffith , 14, 15
A		27, 28, 29,	Costomundre
Crookwell (A. G. McDonaid)	. ,,	,,,	Cootamundra ,, 21, 22,

WRITE to the Department of Agriculture for a copy of the "List of Publications." It is issued free of charge.

# Trials with Branding Specifics.

E. A. ELLIOTT, Sheep and Wool Expert.

THE search for a suitable mixture for use in branding sheep is exercising the minds of many people in different countries at the present time. There are two points of view, and, therefore, two requirements in the perfect brand or mark:—

- 1. The sheep-owner requires a brand which will remain legible from shearing to shearing, so that when he brands his sheep after shearing he can be confident that at any time during the year his brand can be seen and deciphered. The law provides that all sheep marketed must be legibly branded with the owner's mark, and if this necessitates a second application of the brand during the year, that particular specific is not satisfactory. A black mark is the most common, but other colours are made and sometimes used.
- 2. The manufacturer requires that the brand be removable in the ordinary scouring process. For many years complaints have been heard from the manufacturers that great expense is occasioned and loss incurred from "tar" or "brand marks" in wool. Originally, tar was the usual branding agent, but because of continued complaints from manufacturers the use of tar for this purpose has not been the practice for some years. The complaints still continue, and it is recognised that a number of the brands which give the most lasting results cannot be readily removed, and therefore, give rise to these complaints.

Trials of various branding specifics have been carried out from time to time by this Department, and in the last three years trials have been in progress with most of the branding specifics which are at present on the market. Fifteen proprietary mixtures, in addition to the specifics made up by the Department, have been tried out. During last season the British Woollen Research Association forwarded two formulae, which were made up by the Department's Chief Chemist, and one mixture ready for use. These three were added to the trials already in progress.

The trials were carried out at different experiment farms, the main trial being at Temora, and last season at Trangie. Trials were also carried out at Cowra, Glen Innes, and at Glenfield Veterinary Research Station. In practically every case the brands were applied immediately after shearing to make them comparable with actual practice.

The results obtained at Temora were not at all satisfactory, as none of the brands could be scoured from the wool. For this reason the trial was repeated at Trangie, seventeen specifics being included, with an additional one for the last half of the year. Each brand was applied six times.

Inspections were made at different times during the year, and at shearing time the wool containing each brand was carefully collected and scoured. As a result of the inspections made after the brand had been on six months it was found that eleven specifics were still satisfactory, five were unsatisfactory as being under 50 per cent. legible, and the remaining one was indistinct even at that date. At this time a brand forwarded by the British Woollen Research Association was included. To make it comparable, in some cases the wool was shorn off close to the skin before the brand was applied. At the inspection prior to shearing the same brands were found to be similar to the first inspection, the brand applied at the previous inspection being still distinct, making a total of twelve that could be said to be sufficiently distinct.

The samples were scoured in scouring liquid as nearly as possible equal to the usual strengths. In three cases the brand was wholly removed, in three the bulk was removed, in nine part only was removed, and in three the brand was not removed, but had become smeared. This cannot be considered at all satisfactory, as the only specifics which scoured out satisfactorily were indistinct as brands at the two inspections mentioned above.

The British Woollen Research Association's mixtures, made up by the Chief Chemist of the Department, and the one forwarded direct were tried out at Glen Innes in the same way as at Trangie.

At the various inspections one of the former continued very legible, the other being not so good, while the red mixture was quite legible for the six months it was under trial. The samples were scoured, but it was not found possible in any case to remove the brand entirely from the wool.

It is intended to test the British Woollen Research Association specifics again in the coming season, in addition to two proprietary mixtures which have come under notice.

# INFECTIOUS DISEASES REPORTED IN JANUARY.

The following outbreaks of the more important infectious diseases were reported during the month of January, 1930:—

Anthrax		•••	•••		***	9
Blackleg	•••					9
Piroplasmosis (tick fever)				•••		Nil.
Pleuro-pneumonia contagi	osa					7
Swine fever			***		•••	Nil.
Contagious pneumonia	***	•••	***	•••	•••	3

-MAX HENRY, Chief Veterinary Surgeon.

# AGRICULTURAL PROGRESS IN CANADA.

In the past five years Canada's revenue from flax fibre production has increased by 206 per cent.; from fur farming by 121 per cent.; from tobacco growing by 94 per cent.; from poultry and eggs by 71 per cent.; from farm animals by 58 per cent.; from wool by 57 per cent.; from honey by 38 per cent.; from field crops by 22 per cent.; from maple products by 17 per cent.; and from dairy products by 7 per cent.

# Farm Forestry.

# V. THE NATIVE AND INTRODUCED TREES OF NEW SOUTH WALES.

[Continued from page 44.]

R. H. ANDERSON, B.Sc.Agr., Assistant Botanist, Botanic Gardens, Sydney, and Lecturer in Forestry, University of Sydney.

### THE COASTAL DIVISION.

The Coastal Division contains a well-defined and important tree flora, including some of the most valuable of our native trees. The western boundary line of the division is taken as a contour line roughly, varying from 2,000 feet in the south to 3,000 feet in the north. In the basin of the Hunter River the division adjoins the Western Slopes Division without the intervening tablelands, the boundary in this case being the approximate 25-inch rainfall line.

For general convenience the division may be divided into three subdivisions, viz., the northern, central, and southern.

The southern subdivision extends from the Victorian border to the Shoalhaven River, and consists mainly of general eucalyptus forests with some little development of brush forests species towards its northern end.

The central subdivision extends from the Shoalhaven River to Lake Macquarie and contains a number of distinct and fairly easily defined areas. In the southern portion is included the Illawarra district, which is characterised by moderately rich soils and good rainfall. Brush forest and better class eucalypts once covered the greater part of this area. In the neighbourhood of Sydney, on the upper slopes of the Illawarra ranges, and on the lower slopes of the Blue Mountains, are found areas of poor sandstone soil from the Hawkesbury sandstone series, which support a typical growth of vegetation. To the west and south-west of Sydney there exists a much drier area, including such places as Richmond and Campbelltown, where the annual rainfall falls as low as 11 inches. The soils on this area are comparatively rich and heavy. A fourth class of district within this subdivision is represented by fairly well sheltered areas where the soil is mainly of a deep sandy loam. Good forest growth is found on this class of soil. To the north of Broken Bay fairly rich soil from Wianamatta shale occurs, supporting good tree growth. There exists, then, a ratherconsiderable diversity of soil and climatic conditions within this subdivision, with a corresponding range of forest development.

The northern subdivision is, on the whole, a sub-tropical one, the average annual rainfall being fairly heavy, varying from 40 to 70 inches, although falling below this figure in a few localities. It includes a fairly wide range of soil and forest types, brush forests being characteristic of the alluvial

flats and rich basaltic soils. The better class of loamy soils support fine eucalypt growth, but there are also stretches of poor sandy soil and tidal flats.

The various species constituting the flora of the Coastal Division exhibit the pronounced effect of latitude, some species, such as Tallow Wood (Eucalyptus microcorys) being characteristically northern in their distribution, while others are limited to, or reach their best development within, the southern portion. Generally speaking, then, although many of the species range from north to south, each subdivision has a partly defined individual flora.

On the whole, however, the trees of the Coastal Division may be conveniently grouped under three general headings, depending on the factors of soil and rainfall, without particular reference to other subdivisional factors. These three types of forests are:—(1) Brush or rain forests, (2) eucalypt forests, (3) vegetation on tidal areas or flats subject to flooding,

Representative forms of each of these types may be found in all subdivisions, but to a variable extent, the brushes, for example, being more a feature of the northern subdivision than of the other two.

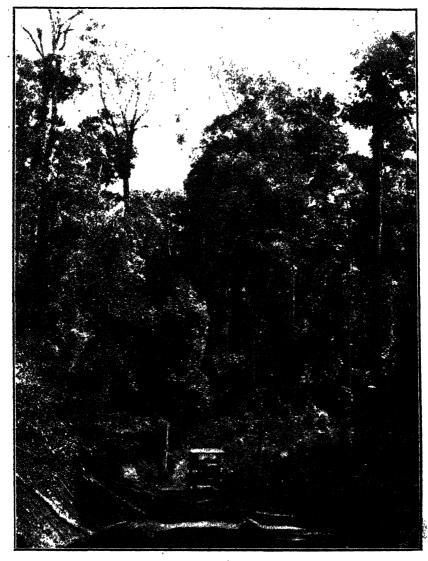
#### Brush or Rain Forests.

These are characteristic of fairly heavy and rich basaltic or alluvial soil in districts which enjoy good rainfall, particularly during the summer and autumn months. Brush species, however, are also found on the poorer classes of soil, provided the rainfall is high, and under artificial conditions a good rainfall often appears to be of more importance than a rich soil. In the northern subdivision the brushes once occupied fairly extensive areas, but a good proportion of these have been cleared during the process of settlement. In the Illawarra district good brush forests were fairly common, and there are still remnants of these which have escaped the axe of progress. Patches of rain forests occur in many parts of the division, particularly on deep moist soil in sheltered sites. Here and there invasion of the Tableland Division is made by typical brush species which take advantage of the shelter offered by gullies, and in isolated areas of the Tablelands, such as at Mount Wilson, a fairly typical brush flora is found.

A large number of species go to form the dense growth of the brush forests. A proportion of these are small growing and form an under-storey to the taller, more valuable trees, and, although serving to protect the forest floor, are of minor importance only. The larger trees of the brushes include a number of valuable species, as varied in their utility as in their botanical distinctions. The most valuable of the timber-yielding species include Red Cedar (Cedrela australis), Silky Oak (Grevillea robusta), Hoop Pine (Araucaria Cunninghamii), Teak (Flindersia australis), and White Beech (Gmelina Leichhardtii). Excellent ornamental and shade trees are supplied by such species as Tulip (Harpullia pendula), Rosewood (Dysoxylon Fraserianum), Black Bean (Castanospermum australe), Silky Oak (Grevillea robusta), Brush Box (Tristania conferta), and many other species.

The brush forests indeed suffer from an embarrassment of richness. Owing to the presence of such a large and varied number of species and the scattered distribution of these, it is difficult to obtain any one species in the large quantities which is desirable for efficient handling and marketing.

Generally speaking, brush species are shallow rooting, but at the same time they are able to withstand some degree of drought, moderately prolonged dry weather being often experienced, particularly during late winter



A Typical Brush.

and spring months. The capacity for drought resistance has been amply demonstrated by a number of species when planted artificially, the outstanding examples being the Silky Oak (Grevillea robusta) and White Cedar (Melia Azedarach), both of which flourish under the dry and trying conditions of the Western Plains Division.



On the Edge of the Brush. Intermingling of Brush Species, Brush Box, and Sydney Blue Gum.

Frequently the brush forests are sharply defined from the more open eucalypt forests, the line of demarcation representing an abrupt change in soil conditions. On the other hand, the margins of brushes are often characterised by a mixture of brush species and certain eucalypts, such as Tallow Wood (Eucalyptus microcorys) and Sydney Blue Gum (Eucalyptus saligna). Turpentine (Syncarpia laurifolia) and Brush Box (Tristania conferta) are also characteristic of these mixed floras.

### Eucalypt Forests.

These are much more open in character than the brushes, and occupy very extensive areas throughout the division, occurring under a big variety of conditions. They vary considerably in character and value according to soil conditions and degree of available moisture, and can be divided roughly into three classes:—

- (a) Those occurring on good deep soils in areas of fairly high rainfall. Such soils are usually loamy in character, with a clayer subsoil, and the principal species found are Tallow Wood (Eucalyptus microcorys), Grey Gum (Eucalyptus propinqua), Sydney Blue Gum (Eucalyptus saligna), Red Mahogany (Eucalyptus resinifera), White Mahogany (Eucalyptus acmenioides), Turpentine (Syncarpia laurifolia), and Brush Box (Tristania conferta).
- (b) Eucalypt forests on poorer soils with lower rainfall. Such soils are usually composed of moderately poor loam or sedimentary soils, the subsoil being more or less clayey. These areas are characterised by such species as Blackbutt (Eucalyptus pilularis), White or Grey Ironbark (Eucalyptus paniculata), White Stringybark (Eucalyptus eugenioides), Spotted Gum (Eucalyptus maculata), and Bloodwood (Eucalyptus corymbosa).

Merging into this type of forest we have areas which are distinctly drier and subject to periodic droughts, although the soils are usually fairly heavy and moderately rich. Such areas are found to the west of Sydney, in the Richmond-Campbelltown districts and in parts of the Hunter Valley, as well as in a few other portions of the division. The chief species found in these areas are Grey Box (Eucalyptus hemiphloia), Broad-leafed Ironbark (Eucalyptus siderophloia), Ironbark (Eucalyptus siderophloia), Broadleafed Apple (Angophora subvelutina), with some White or Grey Ironbark (Eucalyptus paniculata) on the low ridges.

(c) Eucalypt growth on poor, sandy, fairly dry soils. Such areas are found throughout the division, the Hawkesbury sandstone flora of the central subdivision providing a characteristic example. The chief species found under such conditions are Snappy Gum (Eucalyptus haemastoma), Bloodwood (Eucalyptus corymbosa), Yellow Bloodwood (Eucalyptus eximia), Peppermint (Eucalyptus piperita), Coast Ash (Eucalyptus Sieberiana), and Apple (Angophora lanceolata). The growth in such areas, varies from moderately good on the deeper soils to very poor growth on the shallow rocky soils. On the poorest soil it degenerates into a heath vegetation studded with small stunted Bloodwoods and Snappy Gum.

The three classes of eucalypt forests mentioned above form a very rough classification, and some of the species, although characteristic of one class, may be found to a greater or less extent in all three. The three classes, however, form a useful basis for distinction.

### Vegetation on Tidal Areas or Flats subject to Flooding.

These areas constitute only a very minor part of the Coastal Division, but are characterised by a rather distinct flora. The principal species found are Swamp Mahogany (Eucalyptus robusta), Swamp Oak (Casuarina glauca), and various Tea Trees or Paper Bark (Melaleuca spp.). The Bangalay (Eucalyptus botygoides) is also able to thrive in comparatively poorly drained ground.

### Other Features of the Division.

Owing to the great abundance of natural tree growth and the generally favourable conditions for planting work, there is not the same lack of trees usefully performing their function in this division as in others.

Shade and shelter trees are still required in many parts, particularly on flat country, and the advantages of windbreaks for stock and crop shelter have by no means been universally recognised.

In many parts the value of shelter belts and trees is only just being assessed at its true worth. In the past natural forests and belts of timber have been sufficient to provide shelter for adjacent farms and pastoral areas, and it is only comparatively recently that the country is becoming too open and windswept. Some areas, wonderfully rich in fine native trees, have been completely cleared, no provision being made for even shade and shelter trees. The majority of landowners, however, have spared selected trees from the axe, adding both to the practical and aesthetic value of their holdings.

Timber and fuel is plentiful in most parts of the division, but is becoming scarce in the more closely settled districts.

Many examples are to be found of crosion as the result of too drastic removal of forest areas. Some of the northern rivers, including the Hunter and the Bellinger, are becoming wider and more shallow every year, floods are common, and rich alluvial flats are washed away. Acres of the best soil is swept away, and this is largely due to the removal of forest cover on the catchment areas of these rivers and to the destruction of bank-protecting trees. Heavy channelling and erosion of the ground surface is common in parts, notably in the Camden district, where land which once supported good tree growth is now bare and useless. Coastal stream flow has been considerably affected, a characteristic observation being supplied by Mr. A. A. Gollan, of Gosford, who writes:—"Six years ago it took a week of steady rain to show discolouration of the waters of the Narara Creek. Twenty-four hours is enough now. The creek has silted up, and it is possible to wade across in places where 10 feet deep a few years ago."

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Grow Big Calves. No Scours.

100lb. Bag .. 63/-50lb. , .. 32/6

4oz, of Codlivine are sufficient for 6 to 8 Calves.

GUARANTEED ANALYSIS:

Minimum Crude Protein .. 14%

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If restoration of rumination is at all possible after the cow has "lost her cud," this drench will prove effective.

A safeguard against such troubles as indigestion and milk fever.

Keep your cows healthy and thus make possible bigger returns from the herd, and an increased milk flow after calving.

Sold in air-tight and damp-proof canisters.

No. 1, approximately 60 drenches, 63/-

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Appr.

The process of clearing is, of course, essential, but its effects can be minimised by excluding it as far as possible from the main catchment areas of streams.

### Native Trees of the Coastal Division.

The Coastal Division is rich in native trees, containing species which meet the demands of most timber purposes, whether hardwoods, softwoods, or cabinet woods. Unfortunately the softwoods, although including such valuable species as Hoop Pine (Araucaria Cunninghamii) and Brown Pine (Podocarpus elata), occur in very limited numbers and are fast becoming cut out.

Many of the brush species form fine shade and ornamental trees, besides providing valuable cabinet timbers, and the eucalypts furnish the bulk of our hardwood requirements. The following notes on the individual species indicate the wide range of usefulness of the flora both individually and collectively.

### Eucalypts.

These comprise an important part of the flora, and apart from their usefulness for timber purposes, make excellent shade and ornamental trees in some cases. The various species are known locally as Gums, Boxes, Stringybarks, Ironbarks, Bloodwoods, Peppermints, Woollybutts, &c., the nature of the bark forming the basis of distinction. The species are grouped under these broad headings in the following notes.

#### GUMS.

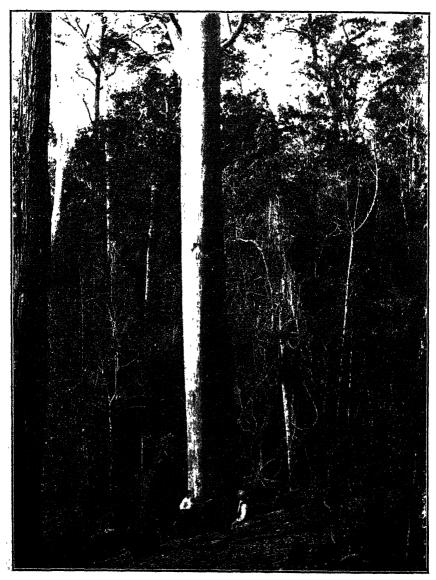
The bark in all so-called species is smooth all over, although a little rough bark is generally present at the butt, extending for various lengths up the trunk. The smooth-barked eucalypts of the Coastal Division include sometwenty species, and the terms Red Gum and Blue Gum are applied to quite a number of these, indicating the necessity of botanical classification for exact identification. The Red Gum of one district may be the Blue Gum of another, and common names are very loosely applied.

Broadly speaking, the Gums may be divided into three groups:-

- (1) Gums with red timbers. These include Eucalyptus saligna, Eucalyptus grandis, Eucalyptus Deanei, Eucalyptus tereticornis, Eucalyptus Seeana, Eucalyptus amplifolia, Eucalyptus Bancrofti, Eucalyptus haemastoma, and Eucalyptus micrantha.
- (2) Gums with pale-coloured timbers. These include Eucalyptus Maideni, Eucalyptus goniocalyx. Eucalyptus Benthami, Eucalyptus Smithii, Eucalyptus viminalis, and Eucalyptus Parramattensis.
- (3) Grey or Spotted Gums. The bark of these is very characteristic, being patchy and rougher than the usual smooth bark of the Gums. They include such species as Eucalyptus punctata, Eucalyptus propinqua, Eucalyptus maculata, Eucalyptus adjuncta, and Eucalyptus canaliculata.

SYDNEY BLUE GUM (Eucalyptus saligna).

. A tall-growing, shaft-like species, usually smooth barked except for a little rough bark at the butt. It occurs throughout the Coastal Division from Bateman's Bay northwards, and is typically a tree of good, deep, fairly moist soils both on flats and hillsides. Like the closely related species, Eucalyptus grandis, it is sometimes referred to as Flooded Gum.



Sydney Blue Gum (Eucalyptus saligna).

Uses.—This species is useful for its timber and for shelter and ornamental purposes. The reddish timber is straight-grained, fairly easy to work, moderately light, and one of the best of our hardwoods for general purposes. It is used freely for building purposes, woodblocks and shipbuilding, but is not so durable underground as many other species.

In South Africa, where it has been fairly largely planted, it is regarded with much favour. Experience there has shown it to be fast growing, fairly hardy to frost, and immature timber from trees under twelve years old is used as a substitute for deal or pine. It is also planted for shelter purposes and windbreaks, and one South African authority quotes it as forming a beautiful and fast-growing large hedge when planted 18 inches apart and kept clipped back.

It is worthy of planting on suitable soil in the Coastal Division for shelter and ornamental purposes.

### FLOODED GUM (Eucalyptus grandis).

A tall, frequently majestic tree, found in both central and northern subdivisions on moist alluvial flats, but is mainly a northern tree. It closely resembles the Sydney Blue Gum (*Eucalyptus salignu*), and is often difficult to separate from that species in the field. Generally speaking, the bark of the Blue Gum is more bluish and blotchy, while that of the Flooded Gum is usually very white or silvery grey. The latter species is also practically confined to moist flats or rather swampy ground, while the Blue Gum is found on slopes as well.

Uses.—Evidence regarding the timber is contradictory. The general opinion is that it is not so durable as that of the Sydney Blue Gum for outdoor work, but is suitable for indoor work. It is usually slightly paler, lighter in weight, rather tougher, but shrinks more than Blue Gum timber. It is regarded by some as a good timber for general carpentry work, but is sometimes apt to warp badly when seasoned.

Deane's Gum (Eucalyptus Deanei), which is more fully dealt with at page 744, Agricultural Gazette, 1929, occurs along the western fringe of the Coastal Division and in other hilly country, usually in sheltered sites. It also closely resembles the Sydney Blue Gum (Eucalyptus saligna), but is distinguished by its much broader sucker leaves.

# Forest Red Gum (Eucalyptus tereticornis).

A small to large sized tree growing in all subdivisions on a variety of soils and sites, but reaching its best development on fairly rich soils on flats. The slaty or bluish bark is usually deciduous in greyish patches or ribbons, the tree being sometimes known as Slaty Gum.

Uses.—The timber is red, hard, heavy, and with an interlocked grain, making it rather difficult to work when dry. It is employed for general building purposes, bridge work, sleepers, &c., and is durable in the ground, being much valued for fencing posts.

Cabbage Gum (Eucalyptus amplifolia) and Bancroft's Gum (Eucalyptus Bancrofti), both of which resemble the Forest Red Gum in many respects, occur in the Coastal Division. (See Agricultural Gazette, 1929, page 745, for fuller description.) The former species is found in all the subdivisions from Candelo northwards, and, compared with the Forest Red Gum, is more an inhabitant of colder, wetter, almost swampy soils. Although not highly regarded locally, timber of this species is favourably regarded in South Africa. Bancroft's Gum occurs as a rather poor scrambling tree with gnarled or twisted branches on rather wet soils in the northern subdivision.

Another eucalypt of the Red Gum class resembling the Forest Red Gum is *Eucalyptus Seeana*, which is known variously as Red Gum, Stone Gum, or Cabbage Gum. It occurs in the northern portion of the division from Port Macquarie northwards, mainly on poorly drained soils or near water, and extends from near sea level to the slopes at over 2,500 feet. It is small to fairly large in size, and resembles the Forest Red Gum in its blotchy bark, but differs from that species in the narrower foliage. The reddish timber is said by many to be durable and useful for fence posts, although rather difficult to split or saw.

### SNAPPY GUM (Eucalyptus haemastoma).

(Also known as Scribbly Gum, Brittle Gum, and White Gum.)

This species occurs as a small, rather scraggy tree on poor sandy soils from Jervis Bay northwards, being typically a tree of the Hawkesbury sandstone series. It is common in the Port Jackson and Hawkesbury River districts, occasionally forming mallee-like thickets. The bark is smooth and bears scribbly markings, the leaves being coarse and dark glossy green.

Uses.—The reddish timber makes good fuel, but is usually too small in size for other purposes. It is brittle, but when large enough lasts fairly well as fencing posts.

Scribbly Gum (Eucalyptus micrantha)—(see Agricultural Gazette, 1929, page 744, for fuller description)—is closely related to this species, and is also found in the Coastal Division, being more widely distributed than its ally. It is also usually a somewhat larger tree, with more drooping, narrower, slightly ashy leaves. In addition to fuel, this tree is sometimes used for fencing posts.

# MAIDEN'S GUM (Eucalyptus Maideni).

A tall-growing tree, fairly commonly known as Blue Gum, found in hilly, rather rough country at fairly high elevations in the southern subdivision and adjoining parts of the central subdivision, making its best growth in deep moist soil in the valleys. It resembles in general appearance and in the silvery young foliage and square young stems both the Tasmanian Blue Gum (Eucalyptus globulus) and the Eurabbie (Eucalyptus bicostata).

Uses.—The pale-coloured timber is strong, moderately heavy, fairly straight grained, and not difficult to work. It is durable, and would appear to be suitable for fence posts.

Other Gums with pale-coloured timbers found in the Coastal Division include the following species:—

Mountain Gum (Eucalyptus goniocalyx) is fairly abundant in many parts of the South Coast, being commonly known as Monkey Gum in the Bermagui district. (See Agricultural Gazette, 1929, page 743, for fuller description.)

Bentham's Gum (*Eucalyptus Benthami*) is very restricted in its distribution, being confined to alluvial soils along the Nepean River, where it is sometimes referred to as Flooded Gum. It is a tall-growing species with a pale-coloured timber of no particular merit.

Smith's Gum or Gully Ash (Eucalyptus Smithii) occurs on the higher hills of the central and southern subdivisions. (See Agricultural Gazette, 1929, page 743, for fuller description.)

Eucolyptus Parramattensis occurs as a fairly small, indifferently shaped tree on stiff, low-lying, moderately poor soils in the central subdivision. It appears to be of no particular value, although the weeping habit of sometrees is fairly graceful.

The White Mountain Ash (*Eucalyptus fraxinoides*) occurs here and there on the upper slopes in the central and southern subdivisions, but is really a: Tableland species.

Manna Gum (*Eucalyptus viminalis*) is not uncommon in parts of the South Coast. (See *Agricultural Gazette*, 1929, page 742, for full description of this species.)

Eucalyptus obtusiflora occurs in northern parts of the southern subdivision and in the central subdivision, being fairly common in the Port Jackson district. It is mainly a shrub or small tree, and is of littleimportance.

(To be continued.)

# PEDIGREE PIGS EXPORTED FROM ENGLAND.

The National Pig Breeders' Association (London) issued 341 pedigree-certificates in respect of pigs exported during 1929. Of this number 227 related to Large White pigs, forty-eight to Berkshires, twenty-seven to Middle Whites, thirty-three to Tamworths, and six to Wessex Saddlebacks. Denmark was the biggest purchaser, no fewer than forty-five Large Whites and one Wessex having been bought for that country. Hungary bought extensively, some thirty-two Large Whites being included among the importations to that country. It is of particular interest that following the re-opening of the Australian ports no fewer than thirty-three Berkshires, twelve Large Whites, three Middle Whites and ten Tamworths were bought to improve the standard of herds in the Commonwealth. Having regard to the efforts made by the Association to secure the admission of pigs via the London Quarantine Station this prompt response in the way of definite orders is especially encouraging.

# Codling Moth Bandage Clip.

T. N. POWELL, Fruit Inspector, Lecton.

ONE of the greatest curses of the pome fruit grower is the codling moth; it has been responsible for the destruction of millions of pounds worth of fruit all over the world. There are many effective preventives of the ravages of this pest, such as winter treatment, spraying, bandaging, &c., and it is with bandaging that this article deals. The bandages that are used around trees are placed there as traps, and by the law of this State growers of pome fruits are compelled to inspect them every fourteen days. This, unfortunately, is not carried out by many growers, owing to ignorance of the benefits derived from close inspection of the bandages, and because the crude methods used for fixing the bands around the trees cause a lot of trouble. It is tedious work having to undo the strings and wire that are often used, and with the nail driven into the trunk of the tree (more commonly used), the bandage thrown around frays at one end and comes off during a rainy spell; where the nail has to be worked through the sacking it becomes rusty and is hard to manipulate, and when the bandage is wet it offers a certain amount of resistance against the nail, causing a considerable waste of time during bandage inspections.

To simplify the procedure of bandage inspection I have devised a simple clip which will, at a very little cost, save any progressive grower of pome fruits a lot of time and reduce his wages bill. The clip does away with the nails, wire, and string, and renders the operation of removing the bandage and re-setting it quite simple.

The clip is made from ordinary No. 13 gauge galvanised fencing wire, which is cut into dowels 4 inches long; these are cut with a chisel in such a way that one obtains two points. When sufficient dowels have been made, they are shaped with pliers, or better still, with a clamp, which can be made by any blacksmith at a cost of about 15s.

The making of the clip is a very simple operation. Fig. 1 shows a dowel in the clamp, and Fig. 2 shows the clamp closed down, and the clip completed by bending over both points with a hammer. Fig. 3 shows where and how to fix the clip on the bandage, and Fig. 4 the method of fastening the bandage round the tree with the clip. The whole process is exceedingly simple. The clip remains attached to one end of the bandage and the other end is thrown around the tree with one hand and caught by the other hand, and the clip inserted. There is no need to hook the clip deep into the bagging, because the clip is so made that it will grip on contact with the bandage, remaining in position without any effort being used, whether the bandage is wet or dry. The clips are very hard to break, and if steel wire is used, the coil of wire should first be heated and allowed to cool without the use of water; this softens the steel and makes the wire

more pliable. After the clips have been made they should be placed over a fire and when red hot suddenly dipped into cold oil or water, which will make them hard again.

At Bathurst Experiment Farm orchard, where these clips were first used, we found that one man could inspect from sixty to seventy trees thoroughly per hour. Recently a test was made with the working of the clips and

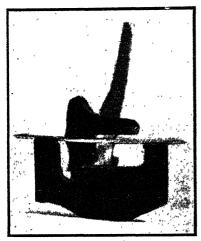


Fig. 1.-A Wire Dowel in the Clamp.

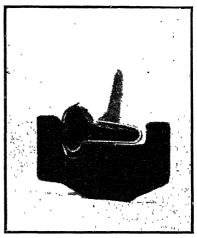


Fig. 2.—The Clip Completed.



Fig. 3.—Fixing the Clip in the Bandage.



Fig. 4.—Fastening a Bandage round a Tree by Means of a Clip.

it was found that with the clips costing 4s. 6d. per hundred ready made, about 6d. per tree was saved in working costs alone, not taking into consideration the less tedious work.

Should any orchardist require a sample clip I shall be pleased to send one along, or to supply any information on the subject.

### IMPORTS AND EXPORTS OF FRUIT.

THE following table, compiled by the Government Statistician, shows the imports and exports of fruit-fresh, dried, and processed-during the quarter ended 31st December, 1929:-

Description.	_	Imports.	Exports.	Description.		Country of Origin.		Imports.	Exports.
Interstate.				Oversea.					
		Cases.	Cases.	Fresh Fruits-	_			Centals.	Centals.
Fresh Fruit	 	010.000	59,952	Apples				Centais.	267
wa .			00,000	Bananas				7,300	
20110000	···i	crates.	crates.	Lemons	•••			278	88
Melons		152		Oranges	•••			326	8,236
112010110 ///	•••	tons.	tons.	Grape Fruit				178	0,200
,,		72		Pears	•••				25
,,	١	•	No.	Pineapples					1,162
,,		•••	14	Other				831	6,003
39	1	lb.	lb.	Dried Fruits-				lb.	lb.
Canned Fruit		89,908	588	Apples, Pea					
		,		Peaches.		U.S.A		38,000	
Dried Fruits-	1			Apples					1,138
Unspecified .		27,090	168	Apricots					1,574
~		10,917	336	Currants	••				26,868
TD - 2 - 2	. 1	9,996	336	Figs		Asia Minor	•••	TAM OUR	
A		3,360				Greece	***	96	
A == 1 ==		3,220	.,			Smyrna	•••	4,583	
TO 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		2,156				Turkey	,	00 000	
Pears		952				U.S.A		43 000	
Prunes		6,012	165,648			U.K		504	
	- (			Peaches		*** *******			349
				Prunes		France		336	39,080
			1	Raisins		U.S.A	• •	1,755	
				Sultanas		U.S.A		18,750	25,846
	1			Lexias		********			474
			1	Other		Spain		20,106	1,462
						U.S.A	••	22,781	1,968
	{			Dates		Algeria		844	32,102
						Arabia		13,797	***
						Asia Minor		200,684	
	1		1 .			Mesopotamia		2,837,643	
	1			Other		China .	,.,	9,213	1,661
				Å		Asia Minor	,,,	3,194	•••
	,		1 '	1		France		57	
	1			1		U.S.A	••	5,060	
	- 1		,					1	
			1	Preserved in liqu					
	,			Apricots	•••				82,930
	- 1			Peaches	•••	***************************************			211,613
				Pears	• •	************			7,993
	,			Pineapple					6,766
				Raspberri	es	,,,,,,,,,,		•••	97,223
	-		1	Other	•••	*** ******		•••	10,117
-			٠. ا	1)		ı		1	•

# Orchard Notes.

MARCH.

C. G. SAVAGE and R. J. BENTON.

### Treatment of Pests of Citrus Trees.

If steps have not yet been taken to deal with pests present on citrus trees, they should be no longer delayed. With a good crop in view, prospects for high prices are not the brightest, and every care must be taken to improve the quality and appearance to ensure the fruit obtaining the maximum return when sold. A good appearance is mainly dependent on freedom from red scale blemishes and on absence of fumagine, the latter being mainly due to an infestation of white wax or brown scale. In addition to these pests, white louse may be present. Red scale particularly, and to a lesser degree, white louse, are very devitalising to the trees, and, if untreated, will usually quickly reduce the tree to an unprofitable state.

Delayed treatment, whilst still effective in controlling the pests, does not result in increased prices for clean fruit, owing to the scale, though perhaps dead, remaining on the fruit. Only rapidly-growing fruit will slough off the dead pests; immediate treatment is therefore recommended.

Two methods of control are available, viz.: (1) fumigation and (2) spraying. The former is strongly recommended, as fruit of brighter, cleaner appearance is obtained, and the percentage of scale killed is much higher, particularly where dense, thriving trees are producing. Fumigation carefully done will kill all insect pests with the exception of white wax scale when fully developed. A pamphlet describing the operation by both the pot method and the use of calcium cyanide is available on application to the Department.

The spraying of scale pests is adopted by many growers, as being less costly. Chiefly red spraying oils, and also white spray oils of various brands are used, with more or less good results. Resin and soda spray is also used by some growers with excellent results. From any spray, however, even if quite successful otherwise, a somewhat dulled appearance usually results, and in regard to the initial cost of the treatment, the white oil sprays are almost equal to the fumigants. Sprays must be used liberally to ensure covering each scale, and a high pressure is essential, particularly on dense trees, to drive the emulsion well through the foliage. White wax is impregnable at the present stage to oil sprays, and is only susceptible to soda wash thoroughly applied. Oil sprays are not very successful in controlling white louse. The latter, if spraying is relied on for control, should be treated with lime-sulphur.

### Pruning and Re-soiling.

Cultural operations will not now be a pressing matter, enabling any pruning necessary to be dealt with. At this period of the year the removal of any strong erect growths from around the centre of young trees and the cutting out of old dead wood are all that is desirable. With regard to the former, trees are in the midst of their autumn growth, and where this is particularly vigorous, shoots are produced around the immediate head of the tree or from the trunk, which, if not suppressed, will later crowd the centre of the tree and may even cause a second story to form—a tall, erect tree.

Where soil erosion is likely to occur, or in orchards planted in shallow soils, resoiling should be effected during the late autumn and early winter months. If any choice is available, soils containing as much organic matter as possible should be used, for, in addition to supplying bulk such soils contain, in the organic matter, the basis for increased fertility.

### Green Manure Crops for Citrus Orchards.

On the district and the location of the orchard mainly depend whether and when a green manure crop should be sown. Green crops usually grow very slowly during the winter months, and conservation of soil moisture in early spring is most important—a green crop cannot safely be allowed to compete with the trees at that period of the year. It is essential, therefore, to sow the crop during the autumn while time permits good development. Usually about the end of February or early March is late enough for sowing, and should enable the crops to be ploughed in by the end of July or early August.

In coastal districts Grey field peas are one of the best producers of bulk. Sowing up to 1 bushel of seed with 1 cwt. of superphosphate per acre is suggested. If no heavy applications of nitrogen have been supplied to the trees in the previous spring or autumn, a very light application—‡ to ½ cwt.—of sulphate of ammonia appears to benefit this crop if applied at seeding.

In inland areas the Tick or Horse bean is probably the best crop to sow. Growing conditions there appear less favourable for fungus development which frequently attacks this plant in coastal climates. Tick beans should be sown at up to 1 bushel per acre with 1 cwt. of superphosphate. Many other crops are successful, but are not so dependable for the production of bulky vegetable matter. However, seed may be sown of Purple vetch. Golden vetch or even ordinary garden green peas and the product sold in localities not subject to heavy frosts.

Where soil moisture is often deficient, and mature trees render green crop growing inadvisable, every opportunity of adding organic matter should be seized. Bush scrapings and rubbish from surrounding areas may be distributed over the land and later ploughed in. Even allowing weeds to grow, with discretion, is preferable to clean culture from this time of the year.

### Planting Citrus Trees.

In localities not subject to severe frosts, refills and also new orchards may be planted with citrus. Planting in such localities enables the trees to become established before severe dry spring weather affects them, as it would if planted later. Only well-developed, sturdy, yearling trees are recommended—preferably budded from selected wood. Cutting back the tops and using a little water at planting is advisable.

### Weed Control in Banana Plantations.

In notes supplied by Mr. H. W. Eastwood, Fruit Instructor, Byron Bay, attention is drawn to the fact that during the summer months, attended with consistent and heavy rainfall, weed growth flourishes and becomes well established before the weather fines up sufficiently to attempt control, which makes the weeds difficult to check during this period. To endeavour to keep weed growth down during optimum growing conditions requires endless work with indifferent results. It is better to cope with this position, which occurs yearly, before and after the wet season. If the plantation is kept free of weeds up till the summer rains commence, generally towards the latter part of December, and then the weed growth is suppressed again when the wet season has passed, little, if any, injurious effects will be done to the plantation during the summer, as there is ample soil moisture for both bananas and weeds, and the excessive weed growth will prevent the washing of soil on the hillsides, and when destroyed, will provide organic matter and humus for the soil after it rots. The plantation may appear to be unkempt, and the control of diseases and pests be rendered somewhat difficult, but on account of expense this can hardly be avoided. It is only during the wet season months that weed growth should be tolerated in a plantation, and even if during this time it is likely to seed, every effort should be made to prevent it doing so; if it cannot be handled in any other way, it should be at least brushed down with a brush hook for the time being.

Preventing weeds from seeding is the best way to keep them in check, and thorough cultivation is an important factor in this regard. If cultivation is thorough from the beginning, with extra attention given for the first twelve months or so, much expense in labour and time during the following years is saved. Hand hoeing or pulling and cultivation with horse implements where possible, provided no damage results, are the best means available.

In the case of large areas where weed growth has got the upper hand, some growers resort to spraying with a poisonous mixture. Arsenic in some form is commonly used, and it has proved the most effective of poisonous sprays in banana areas.

Owing to arsenic not being soluble in water, either washing soda, or caustic soda has to be used to dissolve it, producing sodium arsenite, which is a convenient form in which to use the spray. A useful formula for quick and effective work is: Arsenic, 1 lb.; washing soda, 1 lb., or caustic soda, ½ lb.;

water, 4 gallons. When preparing the solution first dissolve the soda in a convenient amount of water, using heat if necessary to hasten the process, then slowly add the arsenic which has been previously made into a thin paste, stirring all the time; place on a strong fire and after it has come to the boil allow it to remain for at least half an hour, stirring from time to time. When the arsenic has been thoroughly dissolved the solution may be made up to the required bulk by adding the remainder of the water.

Growers are now required by regulation to clean their plantations of weeds at least every six months.

# Leaf Spot Disease of Bananas.

As leaf spot disease was more prevalent last year than usually, growers should keep a strict lookout this winter for this trouble. Seasonal conditions influence the occurrence of leaf spot, and it generally appears in a mild form in the autumn and reaches its climax during late winter, and mainly disappears with the commencement of the warm weather. Young areas are not as seriously attacked as older and established ones, and low-lying, cold situations suffer more than rising and upland areas.

It is not difficult to tell this trouble in the advanced stage. No definite control measures have been laid down for this disease, but its nature would suggest that general cleanliness of the plantation with good cultural methods would be helpful. The trimming of affected leaves and the destruction of them by burning would do away with a lot of the infection. Control measures should be commenced when the disease first appears, as there is more likelihood of checking it then than after it has become well established.

# THE INFLUENCE OF CULTURAL METHODS ON THE AVAILABILITY OF PLANT FOODS.

A CHEMICAL analysis of most farm soils shows that the total amount of plant foods contained is very great, and a comparison of this total with the quantity required annually by cereal crops makes the soil appear almost inexhaustible, especially when it is realised that the structure of the wheat plant is made up, on the average, of only 6 per cent. of constituents from the soil, and the remaining 94 per cent. of water and carbon obtained from the air.

The point often not understood, however, is that only a very small proportion of these necessary elements is in a form available to the roots of the plants, and consequently over-cropping and poor cultivation draw heavily on the available plant food, and lead to temporary exhaustion. The changing of a comparatively small amount of the essential plant foods from an unavailable to an available form may easily make the difference between failure and success in the growing of a crop, and correct cultivation methods are a means to this end.—R. L. Griffiths, in the South Australian Journal of Agriculture.

# Poultry Notes.

MARCH.

# E. HADLINGTON, Poultry Expert

During this month it is advisable to make a survey of the stock with a view to determining what "new blood" is required for the coming breeding The breeding season may appear a long way off, but it is only a matter of six weeks or so before most of the birds should be in the pens becoming settled down ready for an early start in the hatching season. Therefore, it is time to look around, if any new birds are required. It is a mistake to leave the purchase of birds till the last moment, because all the best have then been picked over, and only mediocre or young birds are The introduction of new breeding stock is a very important matter, as it depends upon the suitability of the birds introduced whether improvement is effected or even the existing quality maintained. In purchasing birds quality and physique as well as laying characteristics should be kept in mind with a view to all-round improvement. For this reason it is best, where practicable, to visit the farm from which the purchase of stock is contemplated, instead of relying upon pedigree alone, which, without the necessary constitutional foundation, only leads to deterioration.

The first consideration is the general physique and health of the flock, and particular attention should be paid to the young stock to see if they are well developed and free from sickness. It should be noted whether the birds as a whole are of fairly uniform type, and in summing up the laying qualities, apart from any records, observation should be made as to whether there is a large number of birds showing coarseness, as indicated by surly birds with overhanging eyebrows, small sunken eyes, and wrinkled and feathery faces. This, of course, applies chiefly to the birds under two years old, because the older ones naturally tend to become coarser.

The careful buyer who is aiming at purity of breed and general improvement of quality will look for signs of impurity, such as coloured feathers in white birds, or foreign feathers in black or other coloured breeds, or again willow-coloured legs in breeds which should have black legs. These and other faults, such as numerous rough and sprigged combs, light coloured eyes, &c., are indications of carelessness in breeding or the introduction of impure stock. It should not be imagined that impurities are easily bred out because many birds which appear pure may be tainted with the foreign blood of a previous cross, and for this reason it may take many years of careful selection to get rid of the impurity. This is one reason why those who use only "flock" matings can never hope to maintain a high standard of quality."

There is another factor which should be taken into consideration when buying stock, if good quality is desired; it should be noted whether provision is made for breeding from single matings, i.e., one male and his complement of females in a separate pen. For both quality and egg production, the use of sufficient single breeding pens to enable the breeder to use only those bred from such pens for stud purposes, is essential to secure the best results.

# The Necessity for New Blood.

Some poultry-farmers hesitate about introducing new birds for fear that by so doing they will suffer loss of production, and so they keep on breeding from too-closely related or degenerate stock until they find that they are unable to rear the chickens successfully, which is soon followed by a general lowering of physique of the resultant birds, with the consequent production of a large percentage of small eggs. When this stage is reached it is too late to build up again by simply introducing new blood the next season. It would require several years of careful selection and infusion of new blood to resuscitate such a flock, and sometimes it would pay better to work up a new flock rather than attempt to build up again from the run-down birds.

In many instances where weakness has become apparent new blood has been introduced without any improvement, simply because the birds purchased have been no better bred than the home flock. The careful breeder, however, who understands his business is ever on the alert for weaknesses, and does not wait for a general "breakdown" before taking action. He makes a practice of introducing a new bird or two each season, and if in doubt as to whether the new blood will blend with his flock and produce the desired result, he tries it out on a small number first. By bringing in new stock each year a gradual blending of the new blood is possible, and so the physique and productivity of the flock is maintained.

# Age and Weight of Breeding Stock.

When purchasing birds, age and weight should be kept in mind, and in the case of birds of last season's rearing they should be at least ten months old by the time they are required to breed from, and at that age cockerels of the light breeds should weigh not less than 5 lb. and pullets 4 lb., while the heavy breed cockerels should scale 7 lb. and pullets 5 lb. Birds a year older should weigh at least 1 lb. more if they are of good physique.

Many farmers when desiring to purchase birds are in doubt as to whether they should obtain young birds, or those a year older. In this connection, there need be no hesitation in choosing the young birds provided they are up to the standard outlined as regards age and weight. As a matter of fact, in the heavy breeds particularly, the young birds will usually be found the more satisfactory, as there is always a risk with the older birds that fertility may be low, especially early in the season. Another advantage with young birds is that in the light breeds they can frequently be used for several seasons, and often the heavy breed cockerels are suitable for another season or two.

# Preparing Birds for Laying Tests.

The successful applicants for pens in the Hawkesbury Agricultural College competition should by now be preparing their birds for the coming test. Those who have not already made a first selection of pullets should lose no time in penning a number from which to make the final choice. In preparing the birds it is advisable to select four or five times the number required and to get them settled down in pens under as nearly as possible the conditions obtaining in the competition. If the feeding has been on different lines to the ration fed in the test, a gradual change to it should by now have been made.

In choosing the birds it is best to pick those which appear likely to commence to lay by about the time the test begins. Those which have been laying for some weeks before will nearly always break into a moult later on and thus lose ground. This applies particularly to the light breeds. As time goes on, a gradual elimination will probably be possible, thus leaving a smaller number of birds from which to make the final selection. Among these it is well to have different ages, so that if the most advanced pullets come on to lay too early, later ones can take their place.

# Weights Required.

Nearly every year there are many rejections of birds under the prescribed weight upon arrival at the College, and numerous others only just come up to the weight standards. Attention is drawn, therefore, to the following weights, in order that there may be no doubt as to those required for the various breeds entered: Leghorns, 3½ lb.; Orpingtons, Rhode Island Reds, Plymouth Rocks, &c., 5 lb.; Langshans and Wyandottes, 4½ lb. It should be clearly understood that these are minimum weights, and at least ½ lb. heavier would be preferable.

During the past few years there have been too many birds in the competition laying underweight eggs, and with a view to improvement in this direction the rules have been amended, so that for all the main prizes each bird will now be required to lay eggs weighing not less than 2 oz. Those who have been allotted pens for the next test will therefore do well to consider carefully this aspect when selecting their birds. The small egg trouble is not only confined to competition birds, but is a problem to be faced in the marketing of eggs, and it behoves every poultry-farmer to concentrate upon this matter with a view to increasing the size of eggs.

The tightening up of the competition rules in this respect will, perhaps, assist in impressing upon poultry-farmers the necessity for more careful selection in breeding.

As far as the competition is concerned, a little more attention to the physique of the birds entered should improve matters, but it will take a few years of careful selection of breeding stock and elimination of the small eggs for incubation to overcome the evil.

# Laying Competition Averages.

Another matter which should be borne in mind when selecting birds for the coming test is that during the past four years the general average for the competition has slipped back, and last year it was down to 199.1, compared with 208.5 in the 1924-5 test. Attention to the physique of the birds should also assist in improvement in this direction.

# Keep Up the Quality.

There is a tendency for competitors to complain if some of their birds are rejected on the score of poor quality, but if a rigid stand were taken in this regard there would be more rejections. While there was some improvement last year, many birds entered were not up to the desired standard, and it is proposed gradually to raise the standard of quality each year until more uniformity among the birds competing is attained.

# THE INFLUENCE OF Cactoblastis ON THE PRICKLY-PEAR OUTLOOK.

THERE is no doubt that the introduction of Cactoblastis has completely changed the outlook for prickly-pear destruction. The Board [Commonwealth Prickly-pear Board] and its scientific officers, although satisfied with the success of other established insects, were of the opinion that the control and eradication of the pest would prove a slow undertaking. However, the advent of Cactoblastis, and the demonstration of its remarkable destructive powers, have given rise to greater optimism.

It would be dangerous because of present indications to attempt to prognosticate the end of the prickly-pear menace. The effect of the insects is too recent to permit indulgence of prophecies, however pleasing the prospects. Nevertheless, with the wider distribution of the insect agencies, more particularly *Cactoblastis*, and their ever increasing numbers, the prospects of eventual success are most hopeful. Yearly the density of the pear infestation and the area under its occupation should diminish, and the land be reclaimed for pastoral and agricultural purposes. Indeed, on present promise it is reasonable to expect that vast areas of the pear will be eradicated within a few years.

Here the Board desires to sound a note of warning. The success of a given project rests upon proven results; practical science does not indulge in visions and must take into account all possibilities, favourable and unfavourable. Factors or circumstances may at any time check the destructive rate of the insects' progress. Native parasites, unfavourable weather conditions over a long period, or disease epidemics may reduce their efficiency. Conceivably the pear may acquire a greater measure of resistance to its foes, or the insects may lose their virility.

The prickly-pear problem is not yet solved; that propitious stage will not be reached until the pest has actually been eradicated.—Alan P. Dodo, in "The Progress of Biological Control of Prickly-pear in Australia."

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1st April, 1930.

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Agricultural Gazette of New South Wales.

# Winter Green Fodder Trials. 1929.

FARMERS' EXPERIMENT PLOTS.

# Lower North Coast.

J. M. PITT, H.D.A., Senior Agricultural Instructor.

Trials with winter fodders were carried out in co-operation with the following farmers during the year:-

J. G. Allan, Orange Grove, Bowraville, Nambucca River.

J. G. Allan, Orange Grove, Bowraville, Nambucca River.
F. Wheeldon, Gladstone, Macleay River.
J. Eakin, Belmore River, Macleay River.
E. A. Booth, Austral Eden Bureau, Macleay River.
J. W. Booth, Temagog Bureau, Macleay River.
E. H. Ducat, Temagog Bureau, Macleay River.
A. Pead, Beechwood, Hastings River.
E. V. Suters, Beechwood, Hastings River.
A. R. Longworth, Ghinni, Manning River.
J. P. Mooney, Dumaresque Island Bureau, Manning River.
G. E. Levick, Taree Estate Bureau, Manning River.
R. Richardson, Taree Estate Bureau, Manning River.
C. M. Ford, Taree Estate Bureau, Manning River.
R. Baines, Cedar Party Bureau, Manning River.

R. Baines, Cedar Party Bureau, Manning River. G. H. Bakewell, Cedar Party Bureau, Manning River.

H. W. Lee, Sidebottom, Manning River.

J. J. Milligan, Bulby Brush Bureau.

C. Martin, Burrell Creek Bureau.

F. S. Martin, Burrell Creek Bureau.

Latimore Bros., Burrell Creek Bureau. S. E. Townsend, Bulga Plateau Bureau.

L. Carle, Bulga Plateau Bureau.

Alex. Smith & Son, Bandon Grove Bureau, Chichester River.

V. Heggarty, Bandon Grove Bureau, Chichester River.
R. Dowling, Bandon Grove Bureau, Chichester River.
G. German, Fosterton Bureau.
Bosworth Bros., Fosterton Bureau.

A. R. Lean, Fosterton Bureau.
Lean Bros., Fosterton Bureau.
Robt. Lean, Fosterton Bureau.
S. Ebbeck, Vacy, Paterson River.
R. Ebbeck, Vacy, Paterson River.
M. Smith, Paterson, Paterson River.

Winter fodder growers again experienced unfavourable weather conditions—this being the third bad season in succession and probably the worst of the lot. Winter fodders are a necessary safeguard—especially where very little fodder other than some lucerne hay is conserved. That period of time between the end of the useful paspalum growth, say, April, and the time when the fresh growth and the clover are available in the spring has always been a bad spell for the farmer. Still, it can be got over quite easily if gone about in the right manner; late summer crops-maize, Saccaline, &c.-lucerne, top-dressed pastures, and winter fodders such as rye, oats, wheat, and legumes are the remedy. The progressive men can and do make provision for this period. Proper cultivation methods, however, are essential. By their adoption progressive men can get 20 tons of green succulent fodder to the acre, while others under similar conditions, but with less painstaking efforts, get only half that yield or thereabouts.

While a number of this season's plots were failures, due to unfavourable conditions, lack of soil cultivation, unsuitable varieties and sowing at the wrong time, there were quite a number of very good plots, especially on the Upper Macleay, Central Manning and at Hannamvale and Fosterton. The plots at Temagog gave record yields.

# Weather Conditions.

A dry summer prevented cultural operations except in the most favoured situations. Then during February floods of unprecedented severity occurred throughout the district—the Manning and Hastings experiencing the most disastrous floods in their history. The rainfall for the month ranged between 12 and 4 feet, the latter figure being almost reached on the Hastings. Little wonder that farming operations had to be suspended for many weeks and in some instances months; several areas that had already been ploughed were washed plough deep. Wet conditions followed in March, and it was only on the better drained soils that sowings could be made to time, the majority being late and on insufficiently cultivated plots. With the exception of a useful fall of rain in June, dry, cold, and frosty conditions continued until September, the frost damage in some instances being the severest noticed in my eleven years in the district. Rust was prevalent in some of the earlier-sown and flooded areas. This latter fall of rain was beneficial to the later-sown crops, some of which yielded well. A noticeable feature was that only on the better-worked plo-s were the best plots found

The rainfall over the period was as follows:-

## RAINFALL.

			Upper Macleay.	Taree.	Fosterton.
February March April May June July August Septembe	***	 	Points. 3,308 460 576 116 367 128 135 486	Points. 3,118 399 834 130 270 478 264 546	Points. 1,639 212 525 40 130 317 275 576

The Plots.

Bowraville (J. G. Allan).—Second-class soil, ploughed twice. Sown 22nd April, except rye, which was sown 2nd May. Sunrise grew to nearly 7 feet, although thin. Clarendon also did well. This farmer was impressed with rye, both for rapidity of growth (18 inches in three months) and also as a milk producer.

Gladstone (F. Wheeldon).—Alluvial soil, previous erop maize; ploughed twice—once prior to flood, washed plough deep. Sown 8th May. Buddah did well, also Sunrise and Mulga. Some rust present.

Belmore River (J. Eakin).—Alluvial soil; fallow; ploughed three times—twice before flood; silt left. These were very nice plots and showed very little difference between ½ and 1 cwt. superphosphate. This farmer's unfertilised plots did best at start, but fertilised plots did better later.

Austral Eden (E. A. Booth).—New land, previously under paspalum, which was killed by the flood; ploughed once, disced numerous times and worked. Sown 19th April and 3rd May. Plots did well, although attacked by rust later.

Temagog (J. W. Booth).—Rich, flooded alluvial soil; previous crop maize; ploughed once. Sown 17th April. Good growth took place throughout. Plots spoilt by wind storm in August; rust prevalent.

Temagog (H. Ducat).—Rich, alluvial (covered by flood silt); ploughed once after maize (spoilt by the flood); fertilised. Sown 18th April. Plots grew luxuriantly. Damaged by the wind in August. Mulga did best in combination; but all were splendid plots. The Mulga plot won the Agricultural Bureau Fodder Contest, putting up a new record for the district.

Beechwood (A. Pead).—Second-class soil; previous crop Saccaline. Ploughed twice and harrowed twice after planting. Sown 19th April. Buddah and Florence did fairly well in combination, but yields were not high.

Beechwood (E. V. Suters).—Second-class soil, previous crop maize in 1928; ploughed once and sown with Saccaline in January; spoilt by flood; ploughed again in March; disced and harrowed. Sown on 17th April. Myall and Florence were good crops, outstandingly green and leafy. Yields were fair for class of soil.

Ghinni (A. R. Longworth).—Heavy alluvial soil; ploughed twice, sown in April. Soil cold on account of low-lying situation; not much growth. Too inferior to weigh. Fed off.

Dumaresque Island (J. P. Mooney).—Old lucerne patch which was flooded; ploughed in March, rolled and disced; ploughed again in April, disced and harrowed. Sown on 5th April. These were very good plots, green, succulent and weighty. The Sunrise plots scored well in the Agricultural Bureau Fodder Contest.

Taree Estate (G. E. Levick).—Alluvial soil which was flooded; some top-soil removed after second ploughing in February by that flood followed. Ploughed again 28th March and 20th April. Sown 22nd April with ½ cwt. of superphosphate. The Sunrise-Gresley-Lima and the Mulga-Gresley-Lima were exceptional plots, being succulent, green and weighty. Mr. Levick's plot did very well in the Agricultural Bureau Fodder Contest.

Taree Estate (R. Richardson).—Alluvial soil, ploughed before the flood; rank growth of summer grass followed, which was mown off, raked and burnt. Ploughed twice before sowing. Sown late (6th May) with 120 lb. superphosphate per acre. Early growth, slow although green, continued slow until September rain caused splendid growth.

Taree Estate (C. M. Ford).—Alluvial soil covered with 1 foot of flood deposit. Part ploughed and part sown on flood deposit after harrowing; sown 10th April; the latter portion did best. Buddah was very coarse and rusted.

Cedur Party (R. Baines).—Creek flat, cultivated for forty years; secondclass soil; previous crop maize; ploughed January, disced in February; ploughed, disced and sown first week in May—later plot first week in June with 1½ cwt. of superphosphate per acre. Second sowing on little better soil.

Codar Party (G. H. Bakewell).—Second-class soil; previous crop maize; fallowed; flooded in February; ploughed three times. Sown last week in April. Made fair start; later growth poor owing to dry conditions. Lachlan seemed to resist drought conditions better than any.

Sidebottom (H. W. Lee).—Hilly, second-class soil, fair for class of country; previous crop maize; disc harrowed, ploughed 5 inches deep. Sown 26th April. This was a Black Winter rye manurial and grazing experiment. Portion sown with no manure, portion sown with 80 lb. superphosphate, portion sown with superphosphate plus 56 lb. of nitrate of soda. Splendid growth was made, especially in the lot fertilised with nitrate of soda, the small application of nitrogen causing a wonderful difference in growth. Black Winter rye is the most suitable for grazing in this neighbourhood.

Burrell ('reek (C. Martin).—Second-class soil; previous crop late maize; no crop other than summer grass during summer. Ploughed in March, sown in early May with Black Winter rye; first plot, no manure; second plot, ½ cwt. superphosphate; third plot, 1 cwt. of superphosphate. Very backward growth took place owing to dry conditions. Towards September, however, much more rapid growth was made, the fertilised crops being prominent.

Bulby Brush (J. J. Milligan).—Hillside soil of second-class nature; previous crop winter fodders; left fallow; ploughed twice and otherwise worked. Sown 2nd May. Fairly good growth made. Mulga and Sunrise were not weighed owing to unevenness; Belar was late but fairly good.

Burrell Creek (F. S. Martin).—Rich alluvial loam; ploughed twice after February flood. Sown with Departmental Buddah in comparison with farmers Algerian on 25th April. Splendid growth was made, the plot being green and succulent. The farmer was impressed with Buddah, which matured earlier and yielded heavier than Algerian.

Burrell Creek (Latimore Bros.).—Second-class soil; three years under cultivation; allowed to grass at intervals; ploughed twice and sown in the first week in May. Even growth continued throughout. Mulga was a very nice plot, but was not as succulent as on better class soils. Sunrise and Gresley were the next best.

Bulga Plateau (S. E. Townsend).—Volcanic soil; ploughed and well worked in December; ploughed again in March. Sown in April, but growth slow owing to cold winter. Black Winter rye was the only cereal that made growth and gave most promising results—it grew 5 feet in rapid time whilst others remained practically dormant. Not weighed.

Bulga Plateau (L. Carle).—Red volcanic soil; ploughed twice and in good order. Sown 5th April. Poor growth was made in the cold winter months. Fed off.

Bandon Grove (Alex. Smith).—Rich alluvial soil; previous maize and summer grass which was fed off; ploughed and rolled, disced ploughed, spring toothed. Sown 1st May; then harrowed. Crops very succulent and clean, but late. Buddah and Sunrise in combination with wheat and legumes were the best. All were fine plots as regards legume content.

Bandon Grove (V. Heggarty).—Soil, alluvial flat; ploughed twice. Sown in May and only poor growth took place. Buddah and Canberra did slightly better than Mulga and Gresley. Too thin and uneven to get average weight.

Bandon Grove (R. Dowling).—Alluvial flat; well worked; flooded, silt deposited; ploughed again in April and sown at the end of April. Fair growth took place, the crops eventually reaching 3 feet. These, with the exception of Sunrise, were the most severely frost-damaged plots seen, Buddah and Mulga being badly affected. However, the plots stooled and some green growth was available later in the year.

Fosterton (G. German).—Sandy loam; previous crop maize; ploughed April, harrowed, and sown 25th April, afterwards being harrowed and rolled. There was poor winter growth, except with Sunrise which was far superior to the farmer's own Algerian. Approximate yield of Sunrise was about 10 tons; Mulga and Gresley were not weighed—too uneven.

Fosterton (R. Lean).—River flat soil; ploughed October and again in January; cultivated and harrowed. Flood washed. Sown third week in April; also another plot sown on poor hillside soil, ploughed twice, sown June—too late. A very dry time followed, causing poor growth. There was no apparent difference between fertilised and unfertilised plots due to the dry season. Cape barley (7 tons) was best of barleys. No yields were taken owing to unevenness.

Fosterton (A. R. Lean).—River flat loam; previous crop oats after maize; disced November and December, flooded in February; heavy crop of summer grass; ploughed first and third week of April; disced and harrowed. Sown 26th April and covered with harrow and rolled; 40 lb. superphosphate per <sup>2</sup>/<sub>4</sub> acre. Very poor growth took place owing to dry winter months, but after September there was a better growth. Too uneven to weigh.

Fosterton (Lean Bros.)—Sandy alluvial loam; previous crop maize, grass and weeds. Ploughed by tractor in July, fallowed, disced and harrowed, rolled in September and October. Disced by tractor, very rough, disc harrowed and rolled. Ploughed in January, but was flooded, disc ploughed, harrowed in March, harrowed and rolled. Sown 20th April with superphosphate, 1 cwt. per acre. Early growth was backward owing to dry winter and the barley was poor. Wheats averaged about 8 to 10 tons. Lachlan oats did best, but was uneven and was not weighed.

Fosterton (Bosworth Bros.).—River flat soil; previous crop winter fodders; disc ploughed in November, rolled and harrowed twice in January and again in March, disc ploughed on 18th March, disc harrowed. Seed springtoothed in on 17th April with superphosphate 1 bag to the acre. Vetches and peas sown in drills 2 feet 3 inches apart. The plots were splendidgreen and succulent, and containing ample legumes. A shortage of main towards maturity robbed the plots of weight.

YIELDS in Lower North Coast

								T	IELDS	III IN	Mer	T/ OI 011	Oust
ren	-	-	•					Macle	ay Rive	er.		Foste	rton.
							Belmore River (J. Eakin).	Temagog (E. H. Ducat).	Temagog (J. W. Booth).	Austral Eden (E. A. Booth).	Gladstone (F. Wheeldon).	Bosworth Bros.	R. Lean.
Mulga oats	•••	•••					t. c.	t. c. 21 7	t. c.	t. c. 11 8	t. c.	t. c. 17 1	t. c.
Mulga oats and Can	oerra v	rheat						23 10					
Mulgo oats, peas and				•••									
Mulga oats, Gresley			 and Tal			-						16 10	
			вии ус		•••				1	14 0		16 0	
Mulga oats and peas		•••	•••	•••	•••	***			***	1	13 0	1	•••
Mulga oats, Gresley		_	eas	•••	•••		•••		***		1	•••	•••
Mulga oats and War	ren wh	1e <b>at</b>	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	
Mulga oats, Warata	h whea	t and	peas	•••	•••		•••	•••		11 10	•••	16 8	•••
Sunrise oats	•••	•••	•••	•••	•••		•••	20 12		18 4	13 14		
Sunrise oats and pe	as	•••					***	21 18			•••		
Sunrise oats, Canbe	rra wh	eat an	d peas	•••	•••		•••						
Sunrise oats, Gresle	y whea	t, pea	and v	etches								17 1	
Sunrise oats and W	- arren v	vheat									•••		
Sunrise oats, peas a				•••				l				l l	
Buddah oats						- 1	•••		17 10				
•			•••	•••	•••	***						•••	•••
Buddah oats and ve		•••	•••	•••	•••	•••	•••		•			•••	
Buddah oats and Ca				•••	•••	•••	•••		•	•••			•••
Buddah oats, Gresl	y whe	at and	peas	•••	•••	•••	•••		•••	•••	15 14		··· /
Lachlan oats	•••	•••	•••	•••	•••	•••	•••			•••	•••		••• }
Myall oats		***	•••	•••	•••		•••				•••		
Myall oats and Flor	ence w	heat		•••			•••		•••	•••	•••		
Gresley wheat	•••						•••		16 9		***		
Canberra wheat									14 11			•	
Florence wheat					•••						11 11		
Warren wheat				•••									
Firbank wheat				***						7 17			
Florence wheat and								<b></b>		12 10	1		
Cape barley	-		, ,										7 0
	•••	***	•••	•••	***	•••		""			1		1 1
Trabut barley	•••	•••	•••	***	•••	•••	•••			""			5 0
Skinless barley	***												5 0
Sunrise oats and Classics Sunrise oats and C				_			1	0		""			
Sunrise cats (no m			··· σον (πΩ	manur	 	***		0					:::
Sunrise oats (1 cw	•		hate)	***	***	***	1	0					:::
Belar oats	***	***	***	•••	•••	•••							
Clarendon wheat	•••	***	,	•••	•••	•••						•	
Sunrise cats and (				•••	•••	•••	, •••	1				***	
Mulga oats and F	orence	whea	t	•••	***	•••					•••		
Ŵ											4		<u> </u>

Winter Fodder Trials, 1929.

			Manı	ning Ri	ver.			Pate Ri	erson ver.	Bu Cre	rell eek.	Has Ri	ting ver.	1	River.	er	
1	Dumaresque Is. (J. P. Mooney).	Taree Estate (C. M. Ford).	Taree Estate (G. Levick).	Taree Estate (R. Richardson).	(G. H. Bakewell)	Cedar Party (R. Balnes).	Cedar Party (R. Baines). (Later sowing).	Vacy (S. Ebbeck).	Paterson (M. Smith).	F. S. Martín.	Latimore Bros.		Beechwood (E. V. Suters).	Bandon Grove (A. Smith & Sons)	Bandon Grove (V. Haggarty).	Gre	Bulby Brush (J. J. Milligan).
-	t. c.	t. c.	t. c.	t. c.	t. c. 4 0	t. c. 5 0	t. c. 10 0	t. c. 16 8	t. c. 7 18	t. c.	t. c. 15 0	t. c.	t. c. 5 10	t, c.	t. c.	t. c.	t. c. 15 0
	•••		15 0					15 14			•••					10 0	•••
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				14 14		•••		•••			•••		•••			•••	•••
		15 0	• •••	13 14	6 10				10 10			•••	6 0			;	
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	19 0		17 0	16 6		•••	10 0	•••		•••	13 0		13 4				
			٠	13 15						•••	•••	•••	•••				•••
				10 8			•••	; ; •••				•••		11 15			
		15 10			5 0			17 2	14 5	17 0	•••						
							!			•••	•••	•••		10 17			
	18 0	18 10		21 17		8 0		16 1		•••	10 11	•••		13 4	7 0		•••
	1				•••							•••					13 0
			i		5 0			•••				6 10				[	
	"											4 0	•••			}	
		1	1		•••							8 10	9 0				
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			1			6 10		14 0							•••		
				10 8					8 19	•••							
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Vacy (R. Ebbeck).—Sandy loam; ploughed twice and harrowed. Sown on 14th March—too early. Dry weather following made the crop do poorly. It was eventually fed off.

Vacy (S. Ebbeck).—Loamy soil; previous crop peas; ploughed three-times and springtoothed. Sown on 1st April. Plots germinated well and grew well throughout, Buddah and Mulga being the most promising.

Paterson (M. Smith).—Old lucerne land; ploughed twice, harrowed and cultivated. Sown on 1st May. Germination was good. Dry weather and frosts checked early growth. After the September rains growth was good,. Buddah and Warren being the best.

# Notes on Varieties.

Sunrise Oats stands supreme as the best variety of all winter cereals for the Lower North Coast. Its yielding capabilities, succulence, and all-round adaptability make it a very fine oat for fodder purposes. Although not rustresistant and liable to "yellowing" when sown too early, and also to frosting when frosts are as severe as those experienced this season, still it is moreresistant than other varieties.

Mulga fills second place, being a little inferior only to Sunrise in every respect—possibly taking rust a little more readily. Buddah did well in several places. It has earliness, weight, leafiness, and succulence to its credit, but is just a little behind the Sunrise and Mulga in performance this season. Lachlan showed up fairly well at Cedar Party and Fosterton, especially as a drought resister on second-class soils.

In addition to Gresley—the best variety of wheat to use in combination— Canberra was also useful in this respect, especially with Buddah. In one or two plots Thew showed to advantage. Clarendon, Florence, and Canberra did well sown alone.

Lima field pea was the best tried, and *Vicia dasycarpa* easily the best of the vetches sown in mixture or alone; it is a pity more seed of the latter is not available.

An outstanding feature from a grazing point of view has been the performances of Black winter rye. This season it did remarkably well at Bulga, and on some poorer soils on the uplands of the Manning and districts further south. It is available early and can be grazed many times. Rye has no equal amongst all the cereal crops from a grazing point of view.

The addition of nitrogen as a top-dressing to the plots made a remarkable difference to yield and quality of fodder; especially was this noticeable when used with superphosphate and on the second-class soils, ½ cwt. sulphate of ammonia to the acre being sufficient with 1 cwt. of superphosphate.

# South Coast.

# R. N. MAKIN, Senior Agricultural Instructor.

During the winter of 1929, experiments with varieties of wheat and oats suited to the requirements of dairy farmers were conducted. Altogether twelve trials were set out, but of two no account was taken—one at Exeter

was checked to such an extent by severe frost that most of the varieties failed, and another at Minto was sown too late.

From the results shown below it will be seen that there is a good deal of variation in the yields, which are, for the most part, comparatively low, due undoubtedly to the effect of the low temperatures experienced during the winter on these quick-maturing varieties.

It is interesting to note that the varieties of wheat and oats shown in the table of yields which have stood the test for many years on the South Coast as suiting the conditions, other varieties having been discarded, have also been tried out at different places on the Southern Tablelands and have proved unsuitable owing to their being susceptible to frost. It is not to be wondered at that the unusually hard winter on the coast was responsible for the low returns when rainfall conditions were really favourable to high yields.

The plots at Macquarie Fields had an advantage over other plots in that the ground had been out of cultivation for many years, a feature which contributed largely to the good returns. In all cases the seed and fertiliser was sown broadcast and the seed harrowed in—seed at 2 bushels per acre and superphosphate at 2 cwt. per acre.

### Comment.

Farmers appreciate the quick-maturing varieties, and there is now strong demand, especially for early oats, such as Buddah, Mulga, and Sunrise. Florence wheat is generally ahead of oats in maturity, but as it does not hold its succulence so well as oats it is not so popular. It might, however, be tried with advantage this year by farmers if seed supplies are available. On the Gerringong plots Florence wheat was fit to cut in eighty-nine days from sowing, yielding 7 tons of succulent green fodder per acre.. The quickest oat was Buddah, yielding 5 tons 14 cwt. in 117 days at Campbelltown. At Macquarie Fields this variety gave a yield of 9 tons 1 cwt. per acre in 127 days from sowing, making a very fine growth of succulent feed.

Cattle relish oats more than wheat as green feed, and where vetches or field peas are grown with either of them the feeding value and palatability are increased; 10 lb. of vetches or 30 lb. of peas per acre is sufficient seeding.

The growth of the vetch—Vicia atropurpurea—sown with Gresley wheat and Sunrise oats was very disappointing in nearly every case, and can be attributed to the influence of the weather conditions.

Of the oat varieties, Guyra will be discarded from the green fodder trials on the South Coast this season; it has been under test for many years, and some heavy returns have been taken under favourable conditions. It matures, as a rule, under equal conditions, a little earlier than Algerian; however, as Algerian is a dependable late oat and the demand is for the quicker-maturing varieties, more attention will be given the latter.

YELDS of Winter Green Fodder Trials.

· · · · · · · · · · · · · · · · · · ·		Gerri CO. F.	Gerringong (C. T. Hind- marsh).	Ka Ka G-V	Kangaroo Valley A. Chittick).		Campbelltown (A. Scatter-good).	5	Camden W. Childs).		Macquarie Fields, (E. A. Hoy).		Albion Park (E. Mathie).		Tahmoor (J. Tickle).	(K.)	Dapto (K. Martin).		Milton (L. Garrad)		Menangle (E. Hunt).
	1	.bleiY	Date of harvesting.	.bleiY	Date of harvesting.	Zield.	Date of harvesting,	Zield.	Date of farvesting.	Yleld.	Date of harvesting.	Yleld.	Date of harvesting.	Yield.	Date of Daresting.	Yield.	Date of harvesting.	Yield.	Date of harvesting.	Yield.	Date of Ing.
Florence wheat	:	7;	14/8	5,t 69,?	8/8	÷.4.	17/1	t. c. 6 0	1/21		e. 8 19/7	f. 5 15	12/7	- 60 100	8/8	t. 6.	8/9	t. 6.	2 30/7	4:4	c. 0 25/8
Firbank wheat	:	7 17	5/7	5 15	8/8	67	0 17/7	3 19	8/2	9	5 19/7	20	6 12/7	01	8/8	5 12	8/9	4	2, 30/7	4	0 25/8
Gresley wheat	• ;	8 11	25/7	11 12	13/9	3 11	24/8	4 14	8/08	=	7 24/8	12 6	6 12/8	3 12	15/9	5 11	1/9	ت ت	5, 13/8	4 11	6/8
Gresley wheat vetches	pure	10 0	25/7	10 7	13/9	:	:	5 0	8/08	11	9 24/8	11 14	12/8	3 16	15/9	11 9	1/9	6 11	8/81	res	8/8
Buddah oats	:	9 9	26/7	9 6	3/8	5 14	11//2	8 7	8/1	6	1/61	8 10	12/8	ت. تو	8/8	7 10	1/9	6	4 13/8	9	9/8
Mulga oats	;	10 10	6/6	15 17	13/9	#	5 23/9	7 11	2/9		8 24/8	11 6	6 12/8	2-	5 15/9	:	:	9 14	8/91 1	9	2 1/10
Sunrise oats	:	6 14	6/6	11 12	13/9	<u> </u>	6 23/9	7 15	6/2	=	1 24/8	10 15	12/8	. 7 19	6/91	6 13	1/9	8	7, 24/9	9 14	1/10
Sunrise oats and vetches		10 12	6/6	12 4	13/9	:	:	8	3/8	E1.	5 24/8	111	12/8	9	6 15/9	6 9	1/9	80	5, 24/9	6	2 1/10
Guyra oats	:	6	6/6	11 2	13/9	4	4/10	6 17	2/9	113	8 4/10	11 1	6/1	.c.	5 15/9	4 6	2/10	6	1 24/9	6 10	1/10
Algerian oats	:	10	6/6	16 18	13/9	5 13	4/10	8	23/9	21	3 4/10	14 10	6/2	6 14	6/91	6	2/10	11_	8 26/9	01	0 11/10
Rainfail in points	:	2,6	647		1,669	<u> </u>			,383					ļ ļ		<u> </u>	1,574	ļ!			
Sown	•	18,	18/8/29	) či	92/8/26	2	21/3/29	51	20/3/29	,,,,	26/3/29	e1	20/3/29	Ç1	23/3/29	- G	9/4/59	~1 ———	12/3/29	71	25/3/29

# Pure Seed.

# GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney. not later than the 12th of the month.

Wheat—	
Aussie	J. Parslow, "Cooya," Balladoran.
Bald Early	Manager, Experiment Farm, Trangie.
Cadia	J. B. White and Sons, "Braymont," Boggabri.
Canberra	F. Penfold, "Bluevale," Boggabri.
	Manager, Experiment Farm, Condobolin
	J. B White and Sons, "Braymont," Boggabri.
Clarendon	F. Cornish, "Highfields," Glen Innes.
	C. F. T. Anderson, "Swan Vale," via Glen Innes.
Cleveland	W. Burns, "Goongirwarrie," Carcoar.
Early Bird	J. B. White and Sons, "Braymont," Boggabri.
Federation	W. A. Glenn, Thyra Road, Moama.
	W. G. Law, "Thistledown," Gilgandra.
	E. H. K. King, "Karrindee," Uranquinty.
Hard Federation	Manager, Experiment Farm, Trangie.
Improved Steinwedel	Manager, Experiment Farm, Trangie.
Marshall's No. 3	G. W. Forsyth, "Glencoe," Wallendbeen.
	B. J. Stocks, "Linden Hills," Cunningar.
	W. W. Wolter, Ryan, via Henty.
Nabawa	W. G. Law, "Thistledown," Gilgandra.
	J. Parslow, "Cooya," Balladoran.
	A. D. Dunkley, "Bon Lea," Tyagong, via Grenfell.
	J. Carruthers, "Khan Yunis," Armatree.
Nizam	A. D. Dunkley, "Bon Lea," Tyagong, via Grenfell.
Penny	J. B. White and Sons, "Braymont," Boggabri.
Queen Fan	C. F. T. Anderson, "Swan Vale," via Glen Innes.
Turvey	F. Odewahn, Culcairn.
Union	E. H. K. King, "Karrindee," Uranquinty.
Wandilla	J. Parslow, "Cooya," Balladoran.
	H. J. Harvey, "Kindalin," Dubbo.
Waratah	F. Penfold, "Bluevale," Boggabri.
	Manager, Experiment Farm, Condobolin.
	J. Parslow, "Cooya," Balladoran.
	B. J. Stocks. "Linden Hills," Cunningar.
	Manager, Experiment Farm, Trangle.
	E. H. K. King, "Karrindee," Uranquinty.
	C. F. T. Anderson, "Swan Vale," Glen Innes.
	J. B. White and Sons, "Braymont," Boggabri.
Yandilla King	E. H. K. King, "Karrindee," Uranquinty.
	A. D. Dunkley, "Bon Lea," Tyagong, via Grenfell.

Oats-				
Algerian		•••		C. Bennett, "Theole," Forbes Road, Cowra.
Belar	•••	•••	•••	A. Scrivener, "Hildavale," Gunningbland. Manager, Experiment Farm, Temora.
Lachlan				Manager, Experiment Farm, Temora.
Mulga		•••		C. Bennett, "Theole," Forbes Road, Cowra.
				Manager, Experiment Farm, Temora.
Onions—				-
Improved	Hu	ater R	iver	
Brow	n Spai	nish		S. Redgrove, "Sandhills," Branxton.
Early Hur				
Hunter	Rive		own	
Spani	sh	•••	•••	C. J. Roweliffe, Old Dubbo Road, Dubbo.
Watermelon-				
$\mathbf{Angelino}$		•••	•••	J. C. Rowcliffe, Old Dubbo Road. Dubbo.

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

# TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address-		Number tested.	Expiry date of this Certification.
St. Joseph's Girls' Orphanage, Kenmore	!	9	1 Mar., 1930
G. Miller, Casula		15	1 ,. 1930
New England Girls' Grammar School, Armidale	!	28	16 , 1930
Department of Education, Huristone Agricultural High School	•••	42	10 April, 1930
Navua Ltd., Grose Wold, via Richmond (Jerseys)		10	11 ,, 1930
Australian Missionary College, Cooranbong	•••	43	17 ,, 1930
Department of Education, Gosford Farm Homes	•••	37	24 May, 1930
William Thompson, Masonic School, Baulkham Hills	••	27	24 ,, 1930
F. W. Hopley, Lecton	•••	29	29 ,, 1930
J. F. Chaffey, Glen Innes (Ayrshires)	•••,	56	29 ,, 1930
E. Dianey, Greif Innes (Ayrishres) P. Ubrilhen, Corridgeree, Bega E. P. Perry, Nundorah, Parkville (Guernseys) Sacred Heart Convent, Bowral A. Shaw, Barrington (Milking Shorthorns) St. Patrick's College, Goulburn Walter Burke, Bellefaire Stud Farm, Appin (Jerseys)	• • • •	119	8 June, 1930
E. P. Perry, Nundorah, Parkville (Guernseys)	***	23	14 ,, 1930
Sacred Heart Convent, Bowral	•••	11	17 July 1930
A. Shaw, Barrington (Milking Shorthorns)	•••	104	2 Aug., 1930
St. Patrick's College, Goulburn	•••	9	7 ,, 1930
Walter Burke, Bellefaire Stud Farm, Appin (Jerseys)	•••	52	17 , 1930
MINUSEUM PRIM MUMES MINUSEUM	•••	85	30 ,, 1980
H. W. Burton Bradley, Sherwood Farm, Moorland (Jerseys)	•••	79	4 Sept., 1930
James McCormick, Tumut	***	94	5 ,, 1930
Walaroi College, Orange	•	8	19 ,, 1930
Riverstone Meat Co., Riverstone Meat Works, Riverstone	••	115	27 ,, 1930
J. L. W. Barton, Wallerawang	•••	18	9 Oct., 1930
Blessed Chanel's Seminary, Mittagong	•••	_5	25 ,, 1930
J. L. W. Barton, Wallerawang Blessed Chanel's Seminary, Mittagong H. A. Corderoy, Wyuna Park, Comboyne S. G. Winkley J. Davles, Puen Buen, Scone (Jerseys) Department of Education, Brush Farm, Eastwood Lunacy Department, Callan Park Mental Hospital	***	54	1 Nov., 1980
S. G. Winkley	***	85	8 " 1930
J. Davies, Puen Buen, Scone (Jerseys)	•••	40	11 ,, 1930
Department of Education, Brush Farm, Eastwood	***	7	22 ,, 1930
Lunacy Department, Callan Park Mental Hospital	•••	28	29 ,, 1930
Lunacy Department, Morisset Mental Hospital	•••	21	7 Jan., 1931
Lunacy Department, Morisset Mental Hospital Parbery, C. J., Allawah, Bega Kinross Bros., Minnamurra, Inverell (Guernseys)	•••	88	7 ,, 1931
Kinross Bros., Minnamurra, Invereil (Guernseys)	•••	72	11 ,, 1981
Lunacy Department, Parramatta Mental Hospital	•••	89	23 ,, 1981
Miss Brennan, Arrankamp, Bowral	•••	10	19 Feb., 1931
Department of Education, Yanco Agricultural High School	***	33	21 ,, 1931
G. A. Parrish, Jerseyland, Berry		103	27 ,, 1931
Lunacy Department, Kenmore Mental Hospital	•••	76	29 ,, 1981
St. Michael's Novitlate, Goulburn	•••	5	3 Mar., 1931
Kyong School, Moss Vale	•••	3	4 , 1931
St. Joseph's Convent, Reynold-street, Goulburn	•••	4	4 ., 1931
St. John's Boys Orphanage, Goulburn	•••	7	5 ,, 1931
Ryong Senool, Moss Vale St. Joseph's Convent, Reynold-street, Goulburn St. John's Boys Orphanage, Goulburn Marion Rill Convent of Mercy, Goulburn Tudor House School, Moss Vale	***	10	6 , 1931
Tudor House School, Moss Vale	***	8	21 ,, 1981
			**

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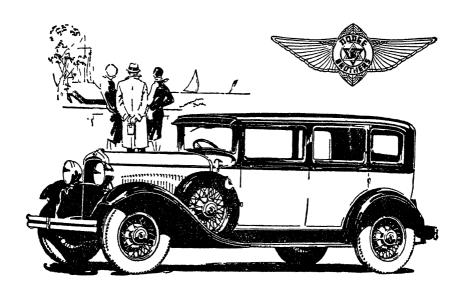
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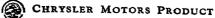


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# DODGE BROTHERS SIX



# Wheat, Oats, and Barley Trials, 1929.

FARMERS' EXPERIMENT PLOTS.

# Central-western District.

W. D. KERLE, H.D.A., Senior Agricultural Instructor.

THE wheat and oat experiments in the Central-western District for 1929 were conducted in co-operation with the following growers:-

# Wheat Variety Trials-

H. J. Balcombe, "Tekoona," Toogong, via Cudal. G. E. Bradley & Son, "Hyton Park," Pinecliffe, via Molong.

W. J. Bradford, "Pine Park," Eulimore, via Eugowra.
Wm. Burns, "Goongirwarrie," Carcoar.
R. B. Black, "Braemar," Greenethorpe.
(Mrs.) C. A. Carter, "Kikiamah," Grenfell.
F. L. B. Corke, Wynnefield, via Cowra.
A. N. Freebairn, "Brundah," Greenethorpe.
W. F. Griffin, "Valicare," Mogongong, via Grenfell.
F. W. Harding, "Redlands," Billimari.
Maroney Bros., Miramichi, Young-road, Grenfell.
F. Mulligan, "Woodlands," Trajere, via Eugowra.
A. S. McDonald, Cranbury, via Canowindra.
H. H. McDonald, "Belmont," Lockwood, via Canowindra.
A. J. McKay, "Maxville," Greenethorpe.
H. Nealon, "Currajong," Quandong, via Grenfell.
D. O'Neill, "Clear View," Bowan Park, via Cudal.
Chas. Pengelly, Forbes-road, Eugowra. W. J. Bradford, "Pine Park," Eulimore, via Eugowra.

Chas. Pengelly, Forbes-road, Eugowra.
Powderley Bros., "Cambrai," Tyagong, via Grenfell.
Robinson Bros., Tallawang, via Gulgong.
W. J. Tranter, "Rosemount," Birriwa.
H. A. Traves & Bros., "Rosebrook," Canowindra.

### Oat Variety Trials-

O. G. Blayney, "Baroola," Grenfell.
W. J. Bradford, "Pine Park," Eulimore, via Eugowra.
Davis Bros., "Laanecoorie," Avenal, via Cargo.
W. F. Griffin, "Valicare," Mogongong, via Grenfell.
Joyce Bros., "Greendale," Tyagong, via Grenfell.
Maroney Bros., "Miramichi," Young-road, Grenfell.
F. Mulligan, "Woodlands," Trajere, via Eugowra.
D. O'Neil, "Clear View," Bowan Park, via Cudal.

C. Pengelly, Forbes-road, Eugowra. H. A. Traves & Bros., "Rosebrook," Canowindra.

### Manurial Trials-

Barr Bros., "Kelvin Grove," Tyagong.

O. G. Blayney, "Baroola," Grenfell.
G. Davidson, "Gambarra," Greenethorpe.
C. L. Baker, "Harlestone," Young-road, Grenfell.

C. L. Baker, "Harlestone," Young-road, Grennen.
G. E. Baker, Brundah Creek, Grenfell.
H. V. Gray, "Martindale," Greenethorpe.
J. T. Hawick, "Alveston," Grenfell.
G. L. McLaren, "Locksley," Nora Creek, via Cumnock.
S. E. Nash, Wollombeen, Eockwood, Canowindra.

### Seeding Trial-

Powderley Bros., "Cambrai," Tyagong, Grenfell.

With two exceptions all these experimenters are members of one of the following branches of the Agricultural Bureau:—Garra-Pinecliffe, Cranbury, Eugowra, Greenethorpe, Tyagong, Quandong, Kikiamah, Cowra, Bowan Park, Birriwa, and Belubula-Lachlan.

## The Season.

The season was the driest ever recorded in the grain-growing section of the central-west. For the fifteen months covering the fallowing and growing period (August, 1928, to October, 1929) the rainfall in this section ranged from 11 to 17 inches. The fallow period was particularly dry up to February and March, when heavy storms resulted in from 2 to 4 inches in each month. The growing period was remarkable for very low winter registrations with a dry spring following. The April to October falls ranged from 4.67 to 7.23 inches, the major portion of the district averaging 5½ to 6 inches for this period.

Compared with the disastrous seasons of 1901-2 and 1918-19 the registrations at Grenfell show that for the August-March fallow period, 2.06 inches more rain fell in 1918-19 and 1.76 inches more in 1901-2 than in the corresponding period of this season. For the growing period April-October only 7 points more fell in 1919, but 1.73 inches more in 1902. In both these seasons there were comparative crop failures, while the yields this season were, under the circumstances, remarkable.

The adverse conditions in the winter of 1928 and the dry spring made the initial ploughing of the fallow and correct fallow working difficult, and the early summer months, being practically rainless, there was no object in cultivating. Up to the February storms the fallows were, therefore, in a dry, loose state, but these and the March rains provided good subsoil moisture and helped to bring about consolidation of the subsurface soil.

The rains at seeding time were light and germination was rather patchy in places—only where full advantage was taken of the late summer rain and the ground worked correctly was germination excellent. It was, however, quite satisfactory, general thinness being to its advantage owing to the dry season which followed. The first rain of any quantity (approximately 1½ inches) fell in August and gave the practically dormant crops a good start. Had it been followed up by good rain in September or early October the yield would have been more than doubled. However, only light falls were recorded, and the crops headed prematurely and lacked density and height. Excellent falls from 10th November were of considerable value in the later localities, but came too late in the main grain sections of the district.

At the end of October a late frost did considerable damage, particularly in the Greenethorpe-Grenfell section and extended north to Cudal. Crops were cut which were from the flowering to the fully-formed, milky, grain stage and considerably more damage was done than is generally realised. The yields were greatly reduced also owing to the feeding off of the crops, which farmers were more or less forced to do to provide sheep-feed, pastures

in winter and spring being very bare. It was particularly noticeable that outstanding crops for the season were those which had not been fed off.

With flag smut, and to a less extent foot-rot prevalent to further assist in reducing yields, the wheat-grower had much to contend with this season.

Rainfall registrations at representative centres are shown in accompanying table. At some centres the early November rain was of value and wherever records are available the actual falls in each locality are given under "Cultural Details."

					Rai	nfall	Recor	ds.					
		Grenfell.	Cowra.	Canowindra,	Eugowra.	Cudal.	Тоокопк,	Greenethorpe.	Tallawang and Birriwa.	Туадопк.	Pinecilife.	Cranbury.	Модопцопц.
1928.		Points.	Points.	Points.	Points.	Points	Points.	Points.	Points.	Points.	Points.	Points.	Points.
					Fal	lowing	Perio	d.					
August September October November December 1929.		88 72 116 110 6	75 39 137 103 8	42 64 178 90 12	67 59 169 122 16	77 58 222 122 16	98 74 200 81 10	89 98 129 72 0	0 24 113 92 62	97 59 102 3 21	35 27 152 78 0	68 36 141 84 0	85 62 109 84 0
January February March		9 173 255	352 292	60 385 211	0 284 242	8 426 408	39 232 286	45 248 224	42 280 101	37 120 204	0 185 211	25 256 248	41 125 230
Total on fall	low	829	1,006	1,042	959	1,337	1,020	905	714	643	688	858	736
					Effecti	ve Gro	wing I	Period.					
1929. April May func fuly August September October		141 62 126 15 183 91 57	85 40 155 11 204 85 69	60 50 129 20 169 77 100	54 66 129 19 192 86 56	87 87 176 27 173 142 92	51 92 175 31 177 124 73	102 53 89 10 199 68 43	200 25 147 50 145 112 197	60 27 82 33 164 55 46	64 98 86 18 127 90 86	70 50 140 25 196 105 133	90 40 84 21 171 75 30
Total on er	op	675	649	605	602	784	723	564	876	467	569	719	511

# Cultural Details of Wheat Variety Trials.

Toogong (H. J. Balcombe).—Light red loam; cleared twenty-five years, box country; disc ploughed end August, harrowed January, springtoothed February, March and April. Combine sown and harrowed 22nd May; 60 lb. each of seed and superphosphate. Germination excellent.

Pinecliffe (G. E. Bradley & Son).—Trials were in two sections, namely, late wheats sown 26th April, and early wheats sown 9th May with Union as a check. Soil, light red loam; cleared 1914; cropped alternately with wheat since; mouldboard ploughed August, springtoothed January, harrowed January, springtoothed March. Combine sown and light harrowed. Late sown plots had an extra harrowing prior to sowing. Seed 60 lb. per acre, superphosphate 70 lb.. The October frost was severe, Penny suffering the worst. Dry weather effect was most marked here.

Eulimore (W. J. Bradford).—Soil, light red sandy loam with gravel ridge intersecting; under crop six years; pine and box country; mouldboard ploughed August, springtoothed October and November, harrowed January,

springtoothed March. Hoe drill sown, harrowed before and after drilling. Two sowings—late varieties on 1st May and early varieties 29th May; seed 65 lb. per acre, superphosphate 68 lb. The rainfall on the growing crop was 6 inches, the October fall being very light. The crops were short and stooled thinly.

Carcoar (W. Burns).—This was a trial of wheat varieties for hay sown on a grey loam under crop twenty years; previous crop, oats; moulboard ploughed October, springtoothed end March. Combine sown 29th April; seed 90 lb. per acre, superphosphate 60 lb. The season was much more favourable here—the rainfall on the fallow (October-March) was 9.76 inches and on the crop (April-November) 12.28 inches.

Greenthorpe (R. B. Black).—Soil, medium red loam; seven crops in succession previous to fallowing with disc cultivator in March; mouldboard ploughed September, harrowed January and February, scarified end February, March and April. Combine sown and harrowed 28th May; seed 61 lb. per acre, superphosphate 95 lb.

Grenfell (Mrs. C. A. Carter).—Soil, medium red loam; originally box country; cropped twenty years; mouldboard ploughed July, harrowed September, springtoothed February, April and prior to sowing with hoe drill 23rd May; harrowed week after sowing; seed 60 lb. per acre, superphosphate 75 lb. Ground in very good condition at sowing time, and germination very satisfactory. Frost was severe, striking one side of the plots particularly, and seriously reducing the yields of Duchess, Nabawa and Rajah.

Cowra (F. L. B. Corke).—Soil, light red loam; box country; cleared about thirty years, cropped last eleven years; mouldboard ploughed August and September, harrowed November and February, springtoothed March, disc cultivated beginning and end of April, springtoothed in front of hoe drill 13th and 14th May; seed 60 lb. per acre, superphosphate 68 lb. Soil in very nice condition at seeding and germination was very good. Flag smut was prevalent in these plots and an examination showed the following degrees of infection:—Union 54 per cent., Gallipoli 28, Waratah 20, Nizam 10, Ford and Rajah 2 per cent., and Nabawa nil.

Greenthorpe (A. N. Freebairn).—Box country; cropped twenty-five years; mouldboard ploughed August, springtoothed February, disced 1st May. Sown with drill 9th May; seed 56 lb., superphosphate 75 lb.

Mogongong (W. F. Griffin).—Soil, grey loam; very old cultivation paddock; mouldboard ploughed second week July, harrowed March, springtoothed mid-April and first week May. Sown with a hoe drill 28th and 29th May; seed 56 lb., superphosphate 80 lb.

Billimari (F. W. Harding).—Soil, medium red loam; cropped fifteen years; box country; mouldboard ploughed end August, harrowed October, disced early February, springtoothed March, April and prior to sowing with hoe drill 15th and 16th May; seed 64 lb., superphosphate 60 lb. Flag smut was prevalent, very bad in Waratah and Bald Early, and is reflected in the yields.

Tyagony (Maroney Bros.).—Soil, medium-strong red loam; originally box country; irregularly cropped twenty years; out to grazing two years prior to these plots; mouldboard ploughed mid-August and harrowed, scarified October, harrowed February, scarified March, springtoothed mid-April. Sown with drill 2nd May; seed 60 lb., superphosphate 60 lb.

Eugowra (F. Mulligan).—Soil, medium-light red loam; cropped about nine years; disc ploughed July, springtoothed October, end February and second week March. Sown with combine and light harrow 13th to 15th May; seed 60 lb. per acre, superphosphate 70 lb. Late varieties could not be sown in April as intended owing to dry condition of ground.

Cranbury (A. S. McDonald).—Soil, light red loam; cropped twenty years; disced mid-May, 1928, and twice harrowed intending to sow that year but conditions not favourable, left out; springtoothed February, 1929 and again mid-April. Sown with drill 16th and 17th May; seed 70 lb. per acre, superphosphate 65 lb. Duchess was low in yield as heavy rain intervened between harvesting the other plots and this variety.

Lockwood (H. H. McDonald).—Soil, strong red loam; cropped about twelve years; originally box country; disced August and again November, springtoothed end February and March, harrowed April, springtoothed May prior to disc drill sowing 14th and 15th May; seed 70 lb. per acre, superphosphate 80 lb. The germination was very good and growth excellent for the season. The rainfall for fallow period was 8.58 inches and for the effective growing period 7.86 inches.

Greenthorpe (A. J. McKay).—Soil, light loam; cropped twenty years; mouldboard ploughed July, disced March, springtoothed end April and prior to combine sowing 13th June; harrowed week later; seed 62 lb. per acre, superphosphate 90 lb. Germination excellent; growth very slow and crop generally thinly stooled and short. Frost damaged the plots considerably, Rajah appearing to suffer most.

Grenfell (H. Nealon).—Soil, grey to light red loam; cultivated thirty years; mouldboard ploughed September, harrowed November, springtoothed end February, and harrowed, springtoothed early May, and harrowed. Sown with hoe drill 20th and 21st May, and harrowed; seed 65 lb. per acre, superphosphate 70 lb. Germination was somewhat uneven due to caking of surface, due to light rain. Rolling with light harrows attached, greatly assisted germination. Frost damage reduced yield quite one-third.

Bowan Park (D. O'Neil).—Soil, strong deep red loam, basaltic origin; cleared thirty years, cropped wheat, oats and maize; mouldboard ploughed July and harrowed, reploughed early October, springtoothed February and April. Sown with combine 6th and 7th May; seed 60 lb. per acre, superphosphate 70 lb. The germination was very satisfactory and growth very good. The rainfall here was heavier than elsewhere in the grain-growing section of the district. Records were not taken on the property but Cudal registrations are approximately correct. The plots were not harvested until third week December and the November rainfall was of particular benefit to this experiment. The crop stooled very well.

Trials.
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Eugowra (C. Pengelly).—Soil, light red sandy loam; first cropped 1915; pine and box country; mouldboard ploughed July-August, springtoothed February and end March. Sown with combine 6th May; seed 70 lb., superphosphate 90 lb. Germination very good. Growth short, even, poorly stooled.

Tyagong (Powderley Bros.).—Soil, light red loam; cropped twenty years; mouldboard ploughed August, scarified September, October and January, harrowed January, scarified April and harrowed. Sown with drill 3rd and 4th June; seed 60 lb., superphosphate 70 lb. Germination satisfactory, except in Bald Early, which was patchy owing to inequality of soil.

Tallawang (Robinson Bros.).—Soil, light red loam; cleared approximately fifty years and cropped considerably. Rotation of (1) winter fodder crop (oats, sown immediately after wheat in March and grazed until end September) and (2) wheat following October fallow. This rotation has been conspicuously successful. Disc ploughed 15th and 18th October, springtoothed 26th February, springtoothed 27th and 28th March, springtoothed 28th April and 7th May. Sown with drill 8th and 9th May; seed 66 lb., superphosphate 80 lb. The average of 21 bushels 36 lb. for the whole experiment is exceptionally fine and so far in advance of other crops in the locality that it can only be attributed to the rotation which is adopted.

Birriwa (W. J. Tranter).—Soil, light sandy loam; cleared about ten years; originally Yarran and box country; sown 1928 with wheat and fed off; disc ploughed December, 1928, springtoothed end February and mid-April. Sown with combine 9th May and harrowed; seed 60 lb., superphosphate 70 lb.

Canowindra (H. A. Traves and Bros.).—Soil, medium-light red loam; cropped thirty years; previously box and pine country; mouldboard ploughed end August, harrowed end January, springtoothed February after rain, March and April. Combine sown and harrowed 13th and 14th May; seed 70 lb., superphosphate 72 lb. per acre.

# Cultural Details of Oat Variety Trials.

Grenfell (O. G. Blayney).—Soil, light red loam; cleared twenty years and cropped ever since; previous crop, wheat; mouldboard ploughed August, springtoothed end September and February. Sown with combine 8th May; seed 65 lb. per acre, superphosphate 80 lb.

Eulimore (W. J. Bradford).—Soil, light red sandy loam; pine and box country; previous crop, wheat; disc ploughed January, disced April. Sown with hoe drill 9th April, and harrowed; seed 55 lb., superphosphate 68 lb. Fed off first week June. Very short and thin crop, commenced heading when 9 inches in height.

Cargo (Davis Bros.)—Soil, strong deep red basaltic loam; cropped twenty years; previous crop, wheat; mouldboard ploughed July-August, harrowed end October, disced mid-February, springtoothed April. Sown with combine 31st May; seed 40 lb., superphosphate 70 lb. Season was very

good here in comparison to rest of district. The approximate rainfall for effective growing period was 9½ inches. The November rainfall was of great benefit to these plots. Harvesting took place at end December.

Mogongong (W. F. Griffin).—Same details as for wheat variety trials. Sown 8th May; seed 45 lb., superphosphate 80 lb.

Tyagong (Joyce Bros.).—Soil, medium red loam; cleared thirty years; box country; previous crop, wheat; disced end October, scarified early March, April, and harrowed and scarified just prior to sowing. Sown with hoe drill 28th May; seed 52 lb., superphosphate 78 lb. per acre. This was the driest section of the central west last season.

Tyagong (Maroney Bros.).—Soil, strong red loam; cropped 1928 after having been grazed ten years; disced February, scarified early April. Sown with hoe drill 24th April; seed 60 lb., superphosphate 63 lb. Germination was patchy and growth very thin; came into ear at 6 inches in height. Too short to harvest; was fed off with sheep.

Eugowra (F. Mulligan).—Same details as wheat variety trials. Sown 15th May; seed 50 lb., superphosphate 70 lb.

Bowan Park (D. O'Neil).—Same details as wheat trials. Sown 8th and 9th May; seed 50 lb., superphosphate 70 lb. Did not benefit to nearly same extent as wheat from November rainfall. Gidgee was damaged by wind and shelled out considerably.

Eugowra (C. Pengelly).—Same details as wheat trials. Seed 50 lb., superphosphate 90 lb. Oats eaten bare end August; recovered well but were thin, particularly Buddah and Palestine.

Canowindra (H. A. Traves and Bros.).—Same details as wheat trials. Sown 13th May; seed 50 lb., superphosphate 72 lb.

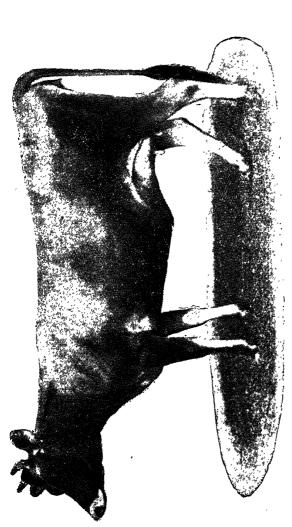
### Wheat Manurial Trials.

Experiments were sown with wheat and varying quantities of superphosphate to determine the most satisfactory amount to apply. The results are set out in tabular form on page 267.

In addition, experiments were made with superphosphate versus gypsum ("Dawson's Fertiliser"), applied through drill at sowing time; Waratah variety. The following yields were obtained:—

Manure per Acre.		Tyagong. (Barr Bros.)	Nora Creek. (G. L. McLaren.)
Superphosphate 112 lb. Gypsum 112 lb. Superphosphate 84 lb. Gypsum 84 lb. Superphosphate 70 lb. Gypsum 70 lb.	 	bus. lb. 12 25 2 39 11 0 3 9 10 7 2 38	bus. lb. 14 30 9 30 16 8 10 17

The results are very much in favour of superphosphate; in fact gypsumtreated plots right from the commencement of growth had the appearance of "unmanured" plots and were always backward and thin; they were

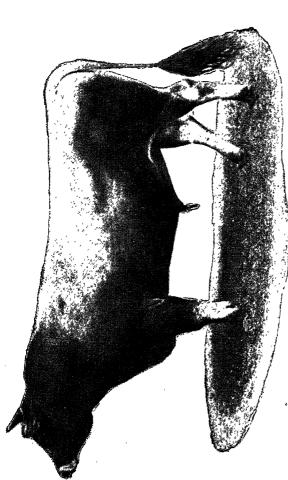


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ersey: Finvoy Golden Nobl following stud bulls:—Cuernsey: Hopeful of Wollongbar (499), 7), First and Champion, R. A. Show, Sydney, 1927. First and Relara (Vol. 8), Second R. A. Show Sydney, 1928. Morning St. scottish Pride of Gowrie Park

MILKING SHORTHORN.

YRSHIRE

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harvested with difficulty in the Tyagong trials. Although the season was particularly adverse the evidence is strongly against the use of gypsum for wheat on this class of soil.

The cultural details of these trials are:—

Tyagong (Barr Bros.).—Soil, light red loam; under crop about twenty-five years; previously box country; mouldboard ploughed August, scarified October, harrowed March, scarified early April and mid-May. Combine sown with Waratah 3rd June; seed 70 lb. per acre. Germination very good.

Nora Creek, Cumnock (G. L. McLaren).—Soil, light red loam; under crop some years; mouldboard ploughed October, springtoothed January, springtoothed and harrowed April. Sown with Waratah 15th May; seed 60 lb. The fallow received very heavy rain in February, 481 points in seven days. Rainfall on crop was 619 points.

The cultural details of quantity-of-superphosphate trials were as follows:—
Greenethorpe (G. Davidson).—Soil, medium red loam; cropped twentyfive years; white and yellow box country; mouldboard ploughed August,
disced March, springtoothed early April. Sown with combine and light
harrowed 27th April; Yandilla King at 58 lb. seed per acre. Germination
was excellent and subsequent growth was even and dense.

Grenfell (O. G. Blayney).—Same details as oat variety trial. Sown with Aussie 29th May; seed 80 lb. Season very adverse and germination and growth patchy, making results of little practical value.

Tyagong (C. L. Baker).—Soil, light sandy loam; cropped twenty years; mouldboard ploughed mid-September, disced February, scarified May. Sown with disc drill 6th May and harrowed; Waratah at 73 lb. seed per acre. Germination was poor and growth short, thin, and ripened prematurely.

Greenethorpe (H. V. Gray).—Soil, red sandy loam; mouldboard ploughed end October, springtoothed February and April. Sown with combine 31st May, and harrowed; Waratah at 80 lb. seed per acre. Seed-bed rough, and germination patchy. Growth poor and spindly, and as comparable results could not be obtained, it was deemed advisable to feed it off.

Quandong (J. T. Hawick).—Soil, light red loam; cropped thirty years; disc ploughed September-October, harrowed end February, springtoothed twice May. Sown with drill 20th May and harrowed. Penny was the variety sown at 60 lb. per acre. Germination satisfactory and growth good for the season. The lightest quantity of superphosphate gave the highest yield, which is consistent with the previous season's trial.

Lockwood (S. E. Nash).—Soil, medium-light red loam; cropped fifteen years; box country; previous crop, oats; disc ploughed September, spring-toothed February, March, April and May. Sown with combine 22nd May and harrowed. Union was sown at 65 lb. per acre. The highest yield was 21 bushels 12 lb. with 98 lb. superphosphate, but the most economical was \$4 lb., which yielded 20 bushels 44 lb. per acre.

# Oat Manurial Trial.

Brundah Creek (G. E. Baker).—This was a trial with Mulga oats, applying superphosphate versus M17 at 80 lb. per acre. Soil, light loam; mould-board ploughed August, scarified October, early May. Sown 16th May. Rainfall was very light, only 6.65 inches for fallow period and 4.85 inches for the growing period. Owing to patchy germination and poor growth the plots were not harvested separately. They yielded 61 bushels per acre.

# Wheat Seeding Trial.

Tyagong (Powderley Bros.).—A seeding trial was made at this centre with Bobin. The cultivation details are same as for the wheat variety trial. The yields were as follows:—

Seed per acre.								d.
lb.							bus.	lb.
90	•••			•••		•••	16	40
60							13	39

# Wheat for Hay Variety Trial.

A trial of wheat varieties for hay was sown on the property of Mr. W. Burns, Goongirwarrie, Carcoar. The cultural details are given above (wheat-for-grain variety trials). The following yields were obtained:—

Variety.						Yield.			
•						t.	c.	q.	Ib.
Cadia	•••			• • •	•••	2	13	0	4
Cleveland	•••	•••		• • • •	•••	2	11	1	7
Canim bla	•••	•••	***	•••	•••	2	5	2	24
Yandılla King		•••	•••	•••	•••	2	4	3	11
Turvey	•••			•••	•••	2	3	3	4

Cleveland has been the standard variety in the locality for some years. Cadia, which outyielded it also last year, may probably supplant Cleveland as a hay variety.

YIELDS of Oat Variety Trials.

Variety.	Grenfell (O. G. Blayney)	Eulimore (W. J. Brad- ford).	Avenal (Davis Bros.).	Mogongong (W. F. Griffin).	Tyagong (Joyce Bros.).	Eugowra (F. Mulligan).	Bowan Park (D. O'Neil).	Eugowra (C. Pengelly).	Canowindra (H. A. Traves & Bros.).
Buddah Gidgee Palestine Belar Kelsall's Myall Lachlan	 	bus. lb. 13 24 15 15 16 12 16 32	bus. lb 29 18 30 0 30 18 31 24 37 20 10 31	bus. lb. 19 21 15 12 13 26 17 24	bus. lb. 21 30 16 4 18 5 22 10 19 0 19 30	bus. lb. 20 10 23 0 28 22 22 30	bus. lb 22 24 28 28 26 20 22 14 25 19	bus. lb. 22 27 15 25 21 36 15 30	bus. lb. 22 21 22 15 21 17

			Greene- thorpe (G. David- son).	Lockwood (S. Nash).	Grenfell (J. T. Hawick).	Tyagong (C. L. Baker).	Grenfell (O. G. Blay- ney).	Greene- thorpe (Barr Bros.)	Cumnock (G. L. McLaren).
Variety	•••		Yandilla King.	Union.	Penny.	Waratah.	Aussie.	Waratah.	Waratah.
Superpho acre- lb.		per 	h 11-	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.
56 70		•••		18 35	16 36 15 30		10 34	10 7	
84 98 112	•••	•••	38 5	20 44 21 12	12 37	10 0	11 22 10 20 16 52	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	16 8  14 30
140		•••	30 8						

YIELDS of Superphosphate Manurial Trials with Wheat.

### Wheat Diseases.

The most prevalent fungus disease with wheat was flag smut, which seriously affected the yield of many varieties. Nabawa still proved itself to be very resistant, and others showing quite a measure of resistance were Ford and Exquisite, and to a less extent Riverina, Cookapoi, Gullen and Rajah. Varieties of Federation parentage suffered most from this disease.

Foot-rot was present to some extent, but probably much of the damage attributed to this disease was caused by the late heavy frost in October.

# Summary.

Wheat Varieties.—In considering the behaviour of wheat varieties this season, two important factors must be taken into consideration, namely, (1) the extremely low rainfall throughout both the fallow and the growing periods, and (2) the prevalence of flag smut. These factors are the principal bugbears of wheat-growers, and coming simultaneously, while disastrous to the farmers, were particularly valuable in determining the value of varieties.

Probably the outstanding features of these trials are the failure of Waratah to stand up to its reputation of previous years and the success of Bobin, Rajah and Nabawa. There is no doubt that the former is due not to the inability of Waratah to withstand droughty conditions, but to its susceptibility to flag smut. This was evidenced in the trials at Toogong, Lockwood and Tyagong, where flag smut was very light in attack and Waratah yielded very well. On the other hand it is probable that the success of Nabawa was due chiefly to its immunity from the disease.

The most interesting result is the excellent performances of Rajah and Bobin. In eight trials through the district (eliminating those where frost damage was variable and the yields hardly comparable), where Rajah,

Waratah, Nabawa and Bobin were sown under identical conditions, Rajah gave the highest yield at four, second highest at one, and third at one centre; Bobin was first at three centres, second at three and third at one; Nabawa second at two, and third at three, while Waratah was third highest at three centres. In one locality Bald Early outyielded these four varieties, although Bobin was only a few pounds lighter.

Bobin is undoubtedly a wheat of high yielding capacity, and its behaviour under the adverse conditions experienced proves its drought resistance, particularly owing to its susceptibility and the prevalence of flag smut. The grain of Bobin, however, was generally pinched and not nearly so attractive as Waratah, Nabawa or Rajah. Last year's experience also showed this variety to be badly susceptible to stem rust.

Rajah evidently combines drought resistance with appreciable flag smut resistance, and is likely to be a very useful variety. It stools well, has good straw and matures a nice sample of grain. It is susceptible to rust, but the grain does not pinch to the same extent as Bobin.

Duri, which has done well in previous years, was also very good. It was tried at five centres and outyielded Waratah at four, and was only beaten by Rajah and Nabawa for first place at two localities. It is worthy of greater prominence than it receives.

Riverina gave the highest yield at Lockwood, and at the neighbouring centres, Billimari and Toogong, it yielded very well. Where conditions were more severe as regards rainfall at Tyagong, it gave the lowest return in two trials.

The yields of the late maturing varieties were very uniform, the most prominent being Yandilla King, Marshall's No. 3, Penny and Canimbla. Exquisite yielded well, but the grain was a poor sample and did not weigh heavily.

The mid-season varieties, on the other hand, varied considerably in yield. Ford and Duchess gave the best results. The former is flag smut resistant, has much to recommend it, and is worthy of extended trial. Duchess is subject to disease, and unless conditions are favourable does not mature a nice sample of grain. The short-strawed Nizain, Union and Gallipoli have, like Federation, suffered in the last few years by comparison, owing chiefly to their susceptibility to diseases, and cannot be recommended for general use in the central-western district.

Manurial Experiments.—Despite the dryness of the season the heaviest applications of superphosphate gave the highest returns. It is, however, not advisable to attach too much importance to the yields obtained this season owing to the light rainfall. Previous years' experience was, however, more or less substantiated, and for typical wheat soils in the district the most economical application is probably about 80 lb. per acre.

Oat Varieties.—The season was a particularly bad one for oats, except in late districts, where considerable benefit resulted from the November rainfall. Mulga was the most consistent variety. At three centres where it was sown in comparison with Buddah, Gidgee and Palestine it gave the highest yield. In another locality it was outyielded by Palestine, and in another by Belar, coming second in yield at the latter. Gidgee did not yield up to its reputation for drought resistance, and was most successful in the Eugowra district.

Palestine is a very short-strawed variety, and it was particularly so this season, being harvested with difficulty. It will probably be the most serious rival to Mulga for grain in more favourable seasons. Belar was tried at three centres, and gave the highest yield at two. It is a mid-season variety, which stools and yields well even under dry conditions, has an excellent quality straw and attractive grain, and could with advantage be sown much more extensively.

# Western District (Northern Section).

R. W. McDIARMID, H.D.A., Manager, Coonamble Experiment Farm.

During 1929 cereal experiments were conducted by the following farmers in co-operation with the Department:—

Mrs. Worrell, "Erenbri," Kenebri.

T. A. Butler, "Ryheen," Teridgerie.

R. Johns, "Ule Wallen," Baradine.

C. L. Keeping, "Guinema," Bugaldie.

H. R. Duncan, "Hill Crest," Coonabarabran.

M. D. Redden, Ulamambri, Coonabarabran.

Owing to the seed not being available the plots on the following farmers' properties did not benefit by the excellent conditions which prevailed at the beginning of the month:—Mrs. Worrell, "Erenbri," Kenebri; T. A. Butler, "Ryheen," Teridgerie; and C. L. Keeping, "Guinema," Bugaldie. This resulted in a total failure at the first mentioned, and very poor returns from the other two. Early-sown crops on the same properties stripped over six bags per acre, which clearly demonstrates the paramount importance of sowing at the correct time. This is an aspect which, in this district, makes all the difference between success and failure.

### The Season.

Adverse conditions were experienced in all the districts during the growing period, but early-sown crops, which derived full benefit from the good autumn rains, produced good yields. With the exception of the Kenebri

plots good germinations were obtained, but whereas the early-sown crops were well enough established to withstand the extremely dry period which prevailed during May, June and July, when only 182 points were received, the growth of the late-sown crops was seriously retarded.

Good rains were received in the late summer and autumn, resulting in the well-fallowed lands coming to the fore. The chief limiting factor, however, was the shortage of moisture during the active period of growth, while severe frosts in June and July had a further adverse influence on the yields.

The	rainfall	яt	several	centres	was:

	1929.		Teridgerie.	Baradine.	Coonabara- bran.
January February March April May June July September October November December			   101 56 118 112 170 359	118 130 146 266 68 37 77 124 103 138 171	Not a-ailable.
Tota	ds	•••	 ***	14·03 in.	•••

# Cultural Details.

Teridgerie.—Red loam; ploughed, July 1928, combined August, harrowed three times during the summer and again in April. Sown with combine 12th May, 45 lb. seed per acre, one plot of Clarendon receiving 56 lb. of superphosphate per acre. All the varieties gave light returns, Riverina and Duri heading the list. Although no difference was apparent in the manured plot of Clarendon the ultimate yield showed an increase of 2 bushels in favour of the unmanured plot.

Baradine.—Red to chocolate basaltic loam; cropped wheat, 1928; stubble burnt December and immediately ploughed; combined and then harrowed six times prior to sowing on the 29th and 30th April; wheat 60 lb. per acre and oats at 1½ bushels; one plot of Clarendon wheat received 56 lb. superphosphate per acre.

Three wheat varieties were sown on non-fallowed, light sandy soils, the land being ploughed just prior to sowing, which was done at the same time as the main variety trial. Germination in all the wheat plots was good, but some varieties were too thick, particularly Riverina, which produced a good crop where thinly sown. All varieties were tipped, but Clarendon

was rather more seriously affected than the others. Bobin was later and although only fairly good looked the most promising.

Coonabarabran (H. R. Duncan).—Light, sandy loam; not cropped for the past eight years; disc ploughed August, 1928; combined February and March. Sown with Union in early April with the combine at 45 lb. of seed per acre. One plot received 1 cwt. of gypsum, another 56 lb. basic superphosphate, three plots received dressings of 84, 56 and 42 lb. superphosphate respectively, and two, dressings of 84 and 56 lb. of Ephos phosphate respectively.

The oat variety trial received the same cultural treatment as the wheat, the seed being sown in early April in a moist, compact seed-bed. One plot of Guyra was treated with 56 lb. superphosphate per acre.

All the manured plots looked in finer condition than the unmanured, the heavier applications better than the light, while the gypsum plot was the most promising. The growth of the manured plots was probably forced during the early stages and the subsequent dry weather and heavy frosts caused a greater setback than in the case of the unmanured.

All the oats were badly frosted, particularly the Mulga, much of which did not recover. Guyra was the most promising variety; the late maturers generally looked better than the early ones.

Kenebri.—Light, sandy soil; first crop, 1928; disc ploughed 4½ inches deep February, 1929; moisture good; worked with the combine three times (March, April and May). Sown with the drill at 50 lb. per acre 14th May; one plot of Clarendon received superphosphate at the rate of 1 cwt. per acre. All plots were very poor, the heads being tipped and burnt off owing to the extremely dry season. No difference could be observed between the manured and unmanured plots; results would doubtless have been obtained if early sowing had been possible.

Bugaldie.—Dark, heavy loam; well fallowed; ploughed December, disc cultivated three times—January, February and April. Sown 11th to 13th June, one plot of Clarendon being treated with superphosphate at the rate of 56 lb. per acre. No falls of any consequence were received until August. All the plots were badly burnt off but the oats seemed to withstand the drought better than the wheat. No difference could be observed in the Clarendon manured and unmanured plots. Harvested 6th and 7th December with an auto-header; yields very light.

Coonabarabran (M. D. Redden).—Red, basaltic loam; new land; ploughed September, 1928, stiff-tine cultivated February, 1929, harrowed early April and again early in May just before sowing. Sown with combine 14th-16th May; 60 lb. seed. Union wheat was used in the manurial trial with applications of superphosphate at 84, 56 and 42 lb. per acre. In the variety trials Penny was outstanding, while, in the manurial plots the heavier applications gave proportionately increased yields.

# Wheat Variety Trials.

The difference in the yields of two Riverina plots at Baradine is worthy of note, especially as the lighter soil was not fallowed and only ploughed immediately prior to sowing. The lighter classes of soil throughout the district gave 50 to 100 per cent. better yields than the heavier soils.

Waratah was fairly consistent in all the trials; it does well in this district when sown early. Cleveland and Currawa, as in previous years, retained their reputations in the cooler parts of the district and can be strongly recommended for early sowing.

Nabawa and Bobin have yielded consistently well in all the districts and are recommended as midseason varieties. Nizam, Union and Duri gave very promising results where sown.

The experiments have again demonstrated that the late maturers are the most suitable for the Coonabarabran and Bugaldie districts, while the midseason and early varieties are more suited to the Baradine district.

Variety.			Baradine.		Bugaldie.		Coonabara- bran.	Terldgerie.	
			1	bus.	lb.	bus.	lb.	bus. lb.	bus. 1b.
Clarendon		•••		6	25	3	30		7 35
Canberra	,	•••		9	0	3	0	19 42	7 56
Bobin		•••		14	51	6	0	29 38	*****
Duri	• • •	•••		9	58	4	0		10 0
Gluyas Early	• • •	•••		11	34		••		6 20
Nabawa		•••		10	55	7	0	29 56	
Nizam				11	30		••		*****
Riverina	• • •	•••		6	17	••••	••		10 26
Riverina*	•••			9	57	****			*****
Aussie		•••				4	30	27 39	•••••
Cadia		•••				4 5	0	21 36	
Currawa		•••					0	30 19	
<b>Hard Federatio</b>	n					4	0		5 23
Penny		•••				6	0	33 0	******
Waratah*		•••		12	5	4	30	22 0	6 47
Union*	***	•••		11	7	6	0		
Wandilla							••	27 0	*****
Cleveland		***						26 17	
Florence							•••		4 50

YIELDS of Wheat Variety Trials.

# Fertiliser Trials.

Small manurial trials were conducted in conjunction with the variety trials at four centres, Clarendon being used in each case with a dressing of 56 lb. of superphosphate per acre. As, however, the trials at Kenebri were a total failure and the results at Bugaldie extremely poor, no conclusive data could be obtained from these centres. At Baradine there was a very

<sup>\*</sup> On non-fallowed light sandy soil

slight increase in favour of the manured plot, while at Teridgerie the application of 56 lb. superphosphate per acre resulted in a decreased yield of 2 bushels per acre (as compared with the unmanured plot). At Coonabarabran (H. R. Duncan) a small trial was conducted in conjunction with the oat variety trial; one plot of Guyra receiving 56 lb. superphosphate per acre gave an increased yield of  $2\frac{1}{2}$  bushels.

YIELDS of Fertiliser Trials with Wheat.

Fertiliser per acre.	Coonabarabran.					
	M. D. Redden	H. R. Duncan.				
No manure Ephos phosphate 56 lb , 84 ,, Superphosphate 42 .,			bus. lb. 15 24  16 40	bus. lb. 25 0 25 0 21 26 20 0		
,, 56 ,, ,, 84 ,,			$\begin{array}{ccc} 19 & 0 \\ 24 & 48 \end{array}$	21 32 19 0		
Basic superphosphate, 56 lb. Gypsum, 1 cwt	•••	•••	•••••	17 35 25 26		

# Oat Variety Trials.

Yields throughout were very light, even in the more favoured districts; all the early-maturing varieties were seriously affected by the severe frosts, large areas of Mulga in the Coonabarabran district being killed, while Algerian was badly damaged by a windstorm just prior to harvesting. At Coonabarabran Guyra showed up to the best advantage; it withstood the frosts well and produced the best growth for winter green feed.

Experience in this district has indicated that the early varieties will only be useful for grazing until late in the season; they should then be allowed to mature grain. This will induce tillering and to a large extent prevent lodging.

YIELDS of Oat Variety Trials.

Variety.				Baradine.		Bugaldie.		Coonaba (H. R. D	Teridgerie.		
Guyra Mulga Gidgee Sunrise Algerian Belar Buddah Lachlan	***			bus. 21 12 17 11 11	19 10 	bus. 10 10 16 	0 20 	bus. 16 11 17 9 13 13 14 13	lb. 23 0 6 24 7 23 0 5	bus. 13 10 11 11	**

# South-western District.

# G. NICHOLSON, H.D.A., Agricultural Instructor.

The following thirty-five farmers co-operated with the Department in conducting wheat and oat experiment plots in this district for the season 1929-30:-

> Wheat Variety and Manurial Trials. Wheat Variety and Manurial Trials.
> G. P. Circutt, "Uabba," Lake Cargelligo.
> T. W. Turner, "Kia Ora," Lake Cargelligo.
> Franklin and Cooke, "Sunset," Burgooney.
> H. J. Harley, "Wattle Park," Tullibigeal.
> G. A. Wallace, "Banool," Weja.
> J. McMahon, "Glen-Aire," Ungarie.
> D. N. Johns, "Wollongough," Ungarie.
> D. & J. Gagie, "Spy Hill," West Wyalong.
> W. Cashmere, "Weeroona," Hillston.
> T. H. Emery, "Wanganui," Merriwagga.
> H. S. Barrow, Bunda, via Hillston.
> Grant Bros., "Gunyah," Erigolia.
> F. E. Schmidt, "Mountain View," Weethalle.
> W. Hubbard, "Creggie-Lea," Tallimba.
> G. Gow, "Hughendon," Barellan.
> H. T. Manning, "Ravenstone," Barellan. H. T. Manning, "Bavenstone," Barellan.
> A. H. Jennings, Colinroobie, via Barellan.
> P. Corcoran, "Weeroona," Moombooldool.
> H. Sheldrich, "Glenariff," Ardlethan.
> D. W. Edis, "Prestonville," Ariah Park. D. W. EGIS, "Prestonville," Ariah Park.
> D. S. Adamson, Dirnaseer, via Junee Reefs.
> S. Kanaley, "Lynton," Junee.
> H. Rumble, "Carinya," Muttama.
> G. H. Coddington, "Rosebank," Kingsvale.
> H. R. King, "Nangary," Kingsvale.
> R. H. Thackeray, "Wootoona," Young.
> Hobson Bros., "Glen-Lea," Cunningar.
> P. Coelli, "Bindawalla," Berendebba. Rate of Seeding Tests (Wheat).

P. Corcoran, Weeroona, Moombooldool.
D. W. Edis, "Prestonville," Ariah Park.
G. A. Wallace, "Banool," Weja.
H. S. Barrow, Bunda, via Hillston.
T. H. Emery, Wanganui, Merriwagga.
Franklin & Cooke, "Sunset," Burgooney.

H. R. King, Nangary, Kingsvale.

# Cultivation Experiment.

H. J. Harley, "Wattle Park," Tullibigeal.

# Gypsum Trials.

G. G. Ballantine, "Clifton," Ariah Park.

Oat Variety and Manurial Trials.

J. Dillon, "The Pines," Tullibigeal.

J. Dillon, "The Pines," Tullibigeal.
D. N. Johns, "Wollongough," Ungarie.
A. H. Jennings, Colinroobie, via Barellan.
C. Joyner, "Tipperary," Moombooldool.
H. Sheldrich, "Glenariff," Ardlethan.
E. Edwards, "Allambie," Marinna.
E. Lehmann, "Montrose," Junee.
R. H. Thackeray, "Wootoona," Young.
R. Penfold, "Edaville," Quandialla.
H. Rumble, "Carinya," Muttama.
J. E. Dodds, "Greenlands," Batlow.

The experiments were distributed over a wide area, ranging from the favoured South-western Slopes to the early and comparatively newly-settled areas on the South-western Plains. Although there were no complete crop failures, because of the poor yields no records are available from the following: G. P. Circutt, Lake Cargelligo; H. S. Barrow, Merriwagga; H. Sheldrich, Ardlethan; W. Cashmere, Hillston; P. Coelli, Berendebba; R. Penfold, Quandialla.

# The Season.

The incidence of the rainfall and the total registrations for the fallow and crop periods place the season as one of the driest on record. For the fallow period (June, 1928, to March, 1929) the rainfall was exceptionally meagre, total registrations averaging about 7 inches. Preceded by a dry winter, a welcome break occurred in July, but with few exceptions no further rain of any consequence fell until March. Ideal conditions prevailed during July for fallowing, but by mid-August the soil had dried out considerably; consequently later ploughed fallows were unsatisfactory. Because of the absence of rainfall few opportunities were provided for cultivating the fallows during the summer months; hence at seeding time they were mostly poorly compacted, resulting in an irregular moisture content in the seed-bed. The rains of March and April (the latter fell on 3rd and 4th of the month) were insufficient to assure a good soaking of the seed-bed, and with the exception of sowings carried out immediately after the April fall, germinations were, in many instances, most irregular.

Because of the incidence of the falls, the totals of rainfall for the growing period are most misleading. From early April until the first week of August no rains sufficiently heavy to induce germination fell, though they were helpful in keeping alive the wheat which had germinated. Had the April rain been delayed until late in May, in all probability the season, from a wheat-grower's point of view, could have been regarded as highly satisfactory. Other than flooded country (autumn, 1928), the reserve of moisture stored in the subsoil was at a minimum and the crops were dependant largely upon what fell during the growing period.

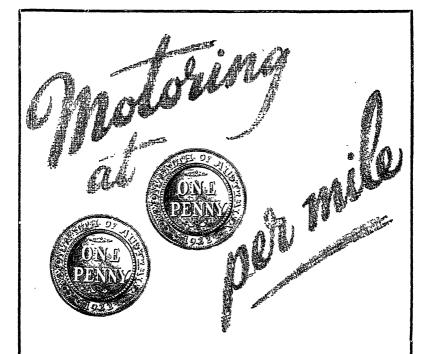
The acute position was relieved by good general rains early in August, but this was followed by dry, unfavourable weather of seven weeks duration. When the position appeared almost hopeless, beneficial rain fell late in September and was supported by remarkably cool weather in October which was favourable to the growth of late crops and slow ripening of the wheat.

The Young-Murrumburrah section—usually most favoured compared with adjoining districts—received only moderate falls in August and October. Partly on account of the heavy nature of the soil, the most severe conditions were experienced on the Bland.

Late in October a particularly heavy frost occurred which did considerable damage. Although a few experiment areas were slightly affected, the greater number escaped serious damage.

# RAINFALL REGISTRATIONS.

Table   Tabl
This series is a series of the series in the
Tillipigeal (A. Wallsoe).  Tillipigeal (A. Walls
12   12   12   12   13   13   13   13
Table 1975 1
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OTORING Economy is one of the most abused marketing phrases of the present day.

Concrete facts, however, as applied to the Morris Minor, have definitely proved that running costs, including depreciation, can be assessed at approximately 2d. per mile.

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### Cultural Details.

Lake Cargelligo (T. W. Turner).—Medium-heavy red loam with a retentive clay subsoil; disc ploughed 3½ inches in August, disced in October, springtoothed in March and April and sown with a hoe drill on 16th April with 55 lb. seed and 56 lb. superphosphate. Patchy germination, not complete until August.

Burgooney (Franklin and Cooke).—Mixed mallee and pine; light, deep, loam—green virgin land; mouldboard ploughed 3 inches in August, spring-toothed in April. Sown with disc drill on 17th April with 60 lb. seed and 56 lb. superphosphate. Wheats burnt off severely due to loose, open character of the soil.

Tullibigeal (H. J. Harley).—Medium-heavy red loam; disc ploughed 4 inches in June, springtoothed in November, scarified in April. Sown with hoe drill on 25th April with 55 lb. seed, 56 lb. superphosphate. Yields reduced 60 to 65 per cent. by hail damage.

Tullibigeal (J. Dillon).—Medium, deep red loam; skim ploughed 3 inches in September, springtoothed in April. Sown with combine on 25th April with 50 to 60 lb. seed and 56 lb. superphosphate. Patchy germination and irregular ripening; oats shelled badly in heavy storm.

Weja (G. A. Wallace).—Medium-heavy deep brown loam; scarified 3½ inches in July, 3 inches in October, and 2 inches in March. Sown with combine on 27th April with 60 lb. seed and 56 lb. superphosphate. Irregular and faulty germination, not complete until August.

Ungarie (J. McMahon).—Deep medium-heavy red loam; three crops previously. Disc ploughed 3½ inches in July, harrowed in September, springtoothed in September and March. Sown with combine on 24th April—65 lb. seed and 56 lb. superphosphate. Patchy germination.

Ungarie (D. N. Johns).—Heavy brown clay, pug subsoil; two crops previously; previous crop Sudan grass. Mouldboard ploughed 3½ inches in July, scarified in September, harrowed in March, scarified in April and harrowed. Sown with hoe drill in dry seed-bed on 26th April; wheat, 50 lb. seed and 56 lb. superphosphate; oats, 60 lb. seed. Protracted germination. Oats shelled freely.

West Wyalong (D. and J. Gagie).—Medium to medium-heavy brown loam, with good clay subsoil; old cultivation; mouldboard ploughed 4 inches in August, springtoothed in October, February, March and April. Sown with hoe drill on 29th April with 65-70 lb. seed and 84 lb. superphosphate.

Hillston (W. Cashmere).—Heavy brown clay loam, plain country; previous crop wheat, 1925; mouldboard ploughed 3½ inches in August. Sown with combine on 9th April with 50 lb. seed and 56 lb. superphosphate. Germination satisfactory but burnt off severely in July and then fed off.

Merriwagga (T. H. Emery).—Deep, light red loam, mixed mallee and box; first crop, 1928, a failure; scarified in April. Sown with disc drill on 8th April with 45 lb. seed and 56 lb. superphosphate. Satisfactory germination but burnt off badly in July.

Erigolia (Grant Bros.).—Medium-heavy red loam, green virgin land; mouldboard ploughed 3½ inches in September, harrowed in February, springtoothed in April. Sown with combine on 18th April with 60 lb. seed and 56 lb. superphosphate. Protracted germination, not complete until August. New land, failed to withstand the dry season.

Weethalle (F. E. Schmidt).—Medium-heavy red loam; two crops previously; mouldboard ploughed 3 inches in June, harrowed in July, scarified in August, springtoothed in October, February and April. Sown with combine on 19th April with 50-60 lb. seed and 58 lb. superphospate.

Tallimba (W. Hubbard).—Medium to medium-heavy brown loam; old cultivation; mouldboard ploughed 3 inches in July, springtoothed in September, harrowed in October, springtoothed in March. Sown with combine on 23rd April with 65 lb. seed and 56 lb. superphosphate. Protracted and faulty germination.

Barellan (G. Gow).—Heavy brown friable, self-mulching clay; old cultivation; scarified 3½ inches in June and 3 inches in August, harrowed in April. Sown with combine on 2nd May, 50-55 lb. seed and 56 lb. superphosphate. Flooded country.

Barellan (H. T. Manning).—Medium-heavy red loam; old cultivation; disc ploughed 3½ inches in June, springtoothed and harrowed in October, springtoothed in May. Sown with combine on 24th May with 70 lb. seed and 84 lb. superphosphate. Protracted and unsatisfactory germination.

Colinroobie (A. H. Jennings).—Medium red deep loam; ten crops previously; mouldboard ploughed 4 inches in July, springtoothed in August, harrowed in September, springtoothed in February and March. Sown with hoe drill on 1st May with 60 lb. seed and 84 lb. superphosphate. Burnt off severely.

Moombooldool (P. Corcoran).—Red light sandy mallee; old cultivation; mouldboard ploughed 3½ inches in July, springtoothed in February and April. Sown with disc drill on 22nd April with 45 lb. seed and 112 lb. superphosphate. Yield affected by late frosts.

Moombooldool (C. Joyner).—Red light sandy mallee; two crops previously; mouldboard ploughed 3½ inches in July, harrowed in August, springtoothed in February. Sown with combine with 60 lb. seed and 84 lb. superphosphate. Irregular maturity; oats shelled freely.

Ariah Park (D. W. Edis).—Medium deep red loam, good clay subsoil at 18 inches; five crops previously; mouldboard ploughed 4 inches in June, springtoothed in August, scarified in February, springtoothed in April. Sown with combine on 20th May with 75 lb. seed, 84 lb. superphosphate. Union badly affected with flag smut.

Ariah Park (G. G. Ballantine).—Brown shallow, heavy clay, stiff pug subsoil at 3 inches; disced 3½ inches in June, springtoothed in February, harrowed in March, scarified in April and May, harrowed in June. Sown with hoe drill on 4th June with 75 lb. seed and 112 lb. superphosphate.

Dirnaseer (D. S. Adamson).—Heavy red loam, good clay subsoil at 5 inches; mouldboard ploughed 4 inches in August, springtoothed in October

and April. Sown with combine on 20th April with 75 lb. seed and 84 lb. superphosphate. Protracted and irregular germination.

Junee (S. Kanaley).—Medium-heavy granitic red loam; old cultivation; mouldboard ploughed 4 inches in September, harrowed in October, scarified in April. Sown with disc drill on 7th May. Protracted and irregular germination.

Marinna (E. Edwards).—Medium red loam, clay subsoil at 5 inches; old cultivation; mouldboard ploughed 4½ inches in June, harrowed in August, springtoothed in October, January, February and April. Sown with disc drill on 9th May with 60 lb. seed and 60 lb. superphosphate. Gidgee broke down badly and shelled freely.

Junee (F. Lehmann).—Medium-heavy red loam; old cultivation; mould-board ploughed 4 inches in June, harrowed in September and January, springtoothed in March and April. Sown with combine on 29th May with 60 lb. seed.

Muttama (H. Rumble).—Deep light brown friable loam; old cultivation; previous crop wheat, 1926; mouldboard ploughed 4 inches in August, harrowed in September, springtoothed in November and April. Sown with disc drill on 13th May with 70 lb. seed and 84 lb. superphosphate. Slightly frost affected.

Kingsvale (G. H. Coddington).—Light, friable, deep brown loam; old cultivation; mouldboard ploughed 4 inches in August, harrowed in October, springtoothed in November, February and April. Sown with combine on 15th May with 60 lb. seed and 84 lb. superphosphate. Yield of Duchess considerably reduced, due to frost.

Kingsvale (H. R. King).—Light granitic brown loam; old cultivation; mouldboard ploughed 3½ inches in August, harrowed in September, springtoothed in November, harrowed in January, disced in February, scarified in May. Sown with disc drill on 16th May with 75 lb. seed and 56 lb. superphosphate.

Young (R. H. Thackeray).—Medium granitic brown loam, good clay subsoil at 6 inches; old cultivation; previous crop wheat, 1926; mouldboard ploughed 4 inches in September, harrowed in October, scarified in November and January, harrowed in February, scarified in May. Sown with hoe drill on 10th May with wheat, 70 lb. seed and 84 lb. superphosphate; oats, 60 lb. seed and 56 lb. superphosphate. Slightly frost affected.

Cunningar (Hobson Bros.).—Medium granitic brown loam, clay at 6 inches; old cultivation; mouldboard ploughed 4½ inches in August, harrowed in October, springtoothed in February, harrowed in March, springtoothed in April and May. Sown with disc drill on 14th May with 70 lb. seed and 84 lb. superphosphate. Protracted germination, unsatisfactory stand.

Batlow (J. E. Dodds).—Red volcanic loam; previous crop oats, 1928; skim ploughed in January, harrowed; seed and superphosphate ploughed in 3 inches. Sown 31st May with 120 lb. seed and 112 lb. superphosphate. Poor stand due to severe frosts killing seedling plants.

# Cultivation Methods.

Although at some centres the yields were disappointing, some interesting comparisons can be drawn, demonstrating the value of timely cultivation. For example, the plots at Weethalle and Erigolia, 20 miles apart, were sown within a day of each other. At Weethalle the plots, on early ploughed fallow (third crop) and cultivated to advantage, gave an average return of 16½ bushels per acre, whereas at Erigolia, on late ploughed fallow the average was 6½ bushels. The total rainfalls for the growing period were: Erigolia 7.41 inches and Weethalle 6.45 inches. The former had the advantage of an additional inch in April, but despite this the germination was unsatisfactory, due to a poorly compacted seed-bed. Messrs. Grant Brothers were working at a big disadvantage on green, virgin land, but the yields at Weethalle are an excellent example of what can be achieved with a minimum of rainfall on well-prepared fallow.

The value of early winter cultivation with the object of conserving moisture in the soil during the hot, dry summer months is demonstrated by the results obtained on the property of Mr. G. Gow, of Barellan. The land in question was flooded during March, 1928, and with the exception of one fall in July, subsequent rains during the fallow period were insufficient to even form a crust on the mulch. Although the rainfall for the growing period was only  $6\frac{\pi}{4}$  inches the top plot yield was  $33\frac{\pi}{4}$  bushels per acre, and even better results were obtained with an earlier-sown crop.

The cultivation experiment conducted by Mr. H. J. Harley, Tullibigeal, comprises four blocks. Unfortunately no reliable results are available, because of severe hail damage. The yields were:

Treatment.	$\mathbf{Y}_{\mathbf{i}}$	eld.
	bus.	Ib.
No. 1 (Disc ploughed 3½ inches June, scarified April)	5	12
No. 2 (Disc ploughed 31 inches June, springtoothed November, scarified		
April)		16
No. 3 (Scarified March and June, springtoothed November, scarified April)	5	24
No. 4 (Scarified March, mouldboard ploughed 31 inches June, spring-		
toothed November, scarified April)	5	29

# The Varieties.

In the early and mid-season class the outstanding and most consistent varieties have been Bobin, Gallipoli and Nabawa. Bobin was sown at ten centres in the earlier districts, and compared with Waratah it (with one exception and that only a matter of a few pounds) proved to be the higher yielder. The most outstanding differences resulted when the plots yielded six bags or better. For example at Ariah Park, West Wyalong, Ungarie, and Weethalle the average increased yield from Bobin as compared with Waratah was within 3 lb. of 5 bushels. The average results for the nine centres were:—

		,				1			bus.	lb.
Bobin		***	***	***	•••	 ***	***	 	14	9
Waratah	***	***	***		***	 *** '		 	11	3
In favour	of B	obin:	***	***		 •••		 	3	6

YELDS of Wheat Variety Trials.

Cunningar (Hobson Bros.).	P. 1b. 1.7 10 1.7 24 1.7 24 1.7 24 1.7 24 1.7 24	80 18
Young Thackeray).		22 12
Kingsvale (H. R. King).		10 00
Kingsvale (G. H. Coddington).	<u>                                   </u>	27 00
Muttama (H. Rumble).	4	200
Junee (S. Kanaley).	D. D. ID	ĵ
Dirnaseer (D. S. Adamson).	0. 0. 188 188 188 188 188 188 188 188 188 18	
Ariah Park (D. W. Edis).	2 b 1 b 2 c 40 c 40	:
Moombooldool " (P. Corcoran).	. b. lb. lb. lb. lb. lb. lb. lb. lb. lb.	:
Colintoobie (A. H. Jennings).	10 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 11 10 10	:
Barellan (H. T. Manning).	D. 10. 11. 44 11. 46 11. 46 10. 87	:
Barellan (G. Gow).	10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	82
Weethalle (F. E. Schmidt).	16 12 19 19 19 19 19 19 19 19 19 19 19 19 19	:
Rallimba sdmillaT.W).	D. D	:
Erigolia (Grant Bros.).	30 0 0 00 00	:
Metriwagga (T. H. Emery).	0. 22	5 #
West Wyslong (D. & J. Gagie).		:
Ungarie (D. N. Johns).	. b. 11 19 4 1 1 19 4 1 1 1 1 1 1 1 1 1 1 1	
Ungarie .(1. McMahon).	. b. lb 22 12 22 12 22 12    15 56  17 26  17 26  16 48 16 18	:
Weja (G. A. Wallace).	6. 1	:
Tullibigeal (Y.H. Harley).	6 29 20 20 20 20 20 20 20 20 20 20 20 20 20	:
Firstooney (Franklin and Cooke).	ें के क्या का <sub>क</sub> का का	-
Lake Cargelligo (T. W. Turner).		
Variety.	A Bu Bu S	r enquire a in

Ouchess, frost affected.

The previous season Bobin gave promising results, but proved rust-liable in the more favoured districts. On present performances it is superior to Waratah. Not only has it proved to be a heavier yielder, but the straw is stouter and less liable to lodge when well grown, the grain does not shell so readily and furthermore, while not immune, the variety exhibits greater resistance to flag smut than Waratah.

In the Federation class Gallipoli outyielded all others. Unfortunately it is highly susceptible to flag smut and therefore should be grown only on fallow considered to be reasonably free from infection. Compared with Federation or Union the following are the average results:—

						bus.	lb.	
Gallipoli	 •••		 	 		12	52	
Federation or Union	 •••	•••	 	 	•••	10	46	
In favour of Gallipoli						2	6	

In the main wheat-growing belt of the south-west one of the most serious problems confronting the wheat-grower is the control of flag smut. past three seasons have favoured the rapid spread of this disease, and should infection continue to increase at the same rate, the first consideration in the selection of any variety will be its resistance to this disease. Many of our most valuable varieties are highly susceptible. which has gained considerable prominence in crop competitions during the past season, has, however, proved highly resistant. Moreover, the returns have been very satisfactory, and it can be recommended with confidence for the earlier districts. It has yet to be proved that Nabawa will compare favourably with some of the older and tested varieties in a wet year. In the western section this is worthy of but scant consideration as dry seasons predominate. The important feature is that it has proved a hardy wheat under adverse conditions and resistant to disease. On the slopes, when good cultural methods are practised, flag smut is not a serious disease, and it is open to question if Nabawa is a serious rival to Yandilla King or Waratah.

Geeralying (Gluyas x Huguenot), an early maturing variety introduced from Western Australia and reputed to be absolutely immune from flag smut, was tried at Wyalong and Young. Although fairly free from infection in this respect it was not equal to Nabawa, and in yield did not compare favourably.

Of the later-maturing varieties, Penny, Ford and Exquisite did well, and the two old standard varieties, Yandilla King and Marshall's No. 3, were consistent bag fillers. Penny is moderately resistant to flag smut and does well under somewhat dry conditions. It appears to favour the lighter soils. For the past three years it has proved to be the highest yielding variety on the light sandy mallee soils. Exquisite exhibits a tendency to pinch readily, and therefore favourable spring conditions are necessary to ensure maximum returns. Duchess, because of very brittle

straw, tends to choke in the comb of the header and is therefore out of favour.

Further trials were conducted to compare the New South Wales and Victorian strains of Federation. The results were:

			Barellan.	Average.	
New South Wales Strain  Victorian Strain	bus. lb. 6 29 6 28	bus. lb. 20 39 19 48	bus. lb. 25 29 25 28	bus. lb. 17 32 17 15	

Results for the previous season were slightly in favour of the Victorian strain, whereas this season the position was reversed. On the data available it would appear that as far as yield is concerned these two strains are of equal standing.

# Rate of Seeding Trials.

The results of this trial were inconclusive. In the drier districts and on the lighter soils a medium seeding (45 to 60 lb.) has given best returns. Provided the fallow is in reasonably good order and known to be comparatively free from yield-reducing weeds, a medium seeding is favoured. In an average season stooling is encouraged, and the heads, though fewer, are larger and better filled. On the other hand, should the season prove to be dry the chances of the crop ripening evenly are greater than when the stand is too thick, as there is then a tendency for the crop to hay off. In the more favoured districts and on land known to be weed infested, heavy seeding is advisable, as it tends to choke out weed growth. In this respect the results of the Kingsvale plots on old and dirty country are of interest.

# Manurial Trials.

The wide variation in yield of the manurial plots is of particular interest; more so in view of the fact that the season was an adverse one. The late rains, while of great value, undoubtedly favoured the no-manure and gypsum plots. By the end of September many of these appeared to be almost certain failures, but being more backward than the areas treated with superphosphate they derived considerably greater benefit from the favourable spring rains.

The most striking results from heavy applications of superphosphate were obtained from crops grown on well-worked fallow. This feature was more outstanding than usual, due no doubt to the scarcity of moisture—in a good season lack of cultivation may be partly compensated for by a generous supply of moisture. Provided the rainfall is within reason, superphosphate will help to compensate for scarcity of moisture. This is

due to the development of a more robust and deeper-rooted plant. However maximum returns from heavy manuring cannot be expected if the soil has been indifferently cultivated.

Eliminating the low-yielding areas, the applications of 84 lb. and 112 lb. superphosphate gave the best returns, and the most striking results were obtained when the wheat was sown in a good seed-bed.

YIELDS of Wheat Manurial Trials.

	S	uperphosi	phate per	Acre.		No	Gypsum 90 lb.
	154 lb.	140 lb.	112 lb.	84 lb.	56 lb.	Manure.	per acre.
Lake Cargelligo (T. W. Turner	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb
—Federation)	***	•••	6 59	6 50	6 32	•••	
Burgooney (Franklin and Cooke—Waratah)		•••	3 23	4 28	4 23	2 20	
Tullibigeal (H. J. Harley— Waratah)		•••	5 39	5 35	4 59	5 33	
Weja (G. H. Wallace—Waratah)			9 50	9 33	9 9		l
Ungarie (J. McMahon—Federation)			18 15	16 49	15 55		
Ungarie (D. W. Johns—Yan- dilla King)		•••	23 50	23 13	19 45		
West Wyalong (D. and J. Gagie—Waratah)	•••	•••	13 11	11 40	9 57		5 50
Merriwagga (T. H. Emery—Yandilla King)			4 40	5 2	4 54	4 33	0 00
Erigolia (Grant Bros.—Wara-			6 41	6 30	6 0	5 1	•••
weethalle (F. E. Schmidt—	•••	•••				9 1	
Waratah) Tallimba (W. Hubbard—Fed-	•••	•••	18 30	17 45	17 12	•••	
eration) Barellan (G. Gow—Federa-	•••	•••	6 40	6 56	6 43	•••	•••
tion) Barellan (H. T. Manning-	•••	•••	33 32	31 50	25 29	•••	26 28
Federation) Barellan (A. H. Jennings-			11 13	11 25	9 45		
Waratah) Moombooldool (P. Concoran	•••		13 30	11 0	10 15		
—Currawa) Ariah Park (D. W. Edis—	20 42	16 57	19 23		•••	•••	
Waratah) Dirnaseer (D. S. Adamson—			22 44	21 15	18 41		
Yandilla King) Junce (S. Kanaley—Yandilla			17 2	16 28	14 27		
King)	•••		23 27	21 40			١٠
Muttama (H. Rumble—Yan- dilla King)			32 27	30 8	26 22		
Kingsvale (G. H. Coddington —Yandilla King)			34 25	31 55	27 23		
Young (R. H. Thackeray—Yandilla King)			24 58	21 25	21 34		
Cunningar (Hobson Bros.— Yandilla King)			21 48	20 18	18 38		
75	<u> </u>	1	<u> </u>	1	1	<u> </u>	<u> </u>

# Gypsum as a Fertiliser for Wheat.

To test the value of gypsum as a fertiliser for wheat compared with superphosphate, trials were conducted at Ariah Park, Wyalong and Barellan. During the early stages of growth the plots receiving a dressing of gypsum had every appearance of being unmanured, but the late rains favoured their development.

The following yields were obtained in a test conducted on heavy clay soil on the property of Mr. G. Ballantine, Ariah Park, with the variety Warstah:—

Trea	atment.						Yield.		
		bus.	lb.						
1 ton gypsum on 8th March, and	wing		15	44					
,, ,,	1	57	,,	,,			15	2	
1 cwt. gypsum at sowing	•••		•••	•••	•••	•••	7	23	
I cwt. superphosphate at sowing	•••		•••	•••	• • • •	•••	11	54	

It is too early yet to state if, as a result of the heavy applications of gypsum, there has been any improvement in the texture of the soil.

# Manurial Trial with Oats.

Due principally to second growth, which delayed harvesting, the oats shelled freely, hence increased yields as the result of manuring were not as striking as the previous season.

YIELDS	of	Oat	Manurial	Trials.	

Manure 1	D. N. J	Johns,	E. Lehmann,				
	Unga	rie.	Montrose.				
No manure Superphosphate, M17, 90 lb.	60 lb.		 	bus. 18 20 23	lb. 16 25 38	bus. 18 24 23	lb. 14 24 36

# The Oat Varieties.

Patchy germination, late rains favouring prolific second growth, and boisterous weather prior to harvest, resulted in the oats shelling freely, and in consequence yields from some centres were disappointing.

Gidgee, which yielded so well the previous year, did not do so well, due principally to the earlier growth breaking down badly before the crop was fit to harvest. Palestine, though not outstanding, yielded consistently and stood up well to the elements. It is very short in the straw, and therefore is mainly useful as a grain variety. Buddah, which comes into the same class as Mulga as a hay or grain variety, did not give very satisfactory results, though for grazing purposes it provides a good bulk of feed early in the season.

# YIELDS of Oat Variety Trials.

Variety.	Marinna (E. Edwards)	Muttama (H. Rumble).	Young (R. H. Thackeray).	Colinroobie (A. H. Jennings).	Tullibigeal (J. Dillon).	Moombool- dool (C. Joyner).
Algerian Belar Buddah Gidgee Guyra Kelsalls Lachlan Mulga Myall Palestine Sunrise	33 15 25 9 36 7 38 3	bus. lb. 57 27 50 17 57 8 49 15 47 25	bus. lb.  26 17 25 29 27 10  26 38 23 26	bus. 1b.  25 37 18 20 21 22 23 34 33 28	bus. lb 9 2 8 35 15 9 12 26 9 33 16 20 6 29	bus. lb.  22 39 15 2 12 8 20 5 20 38 15 7

# Oats for Hay at Batlow.

At Batlow heavy frosts during the winter months are too severe to permit of sowing oats late in the autumn after the potato crop has been harvested. In future, sowings will take place during the early spring. Heavy frosts during July and August raised a large percentage of the sprouted seed out of the ground, resulting in a thin stand.

The yields were:-

Variety.										
									t. c.	q.
Buddah	•••	•••	•••	•••	•••	•••	•••	•••	16	1
Mulga	•••	•••	•••		•••	•••		•••	1 2	0
Sunrise	•••	•••	•••	•••					1 1	0
Guyra	•••	***		•••	•••	•••	•••	•••	0 18	0
Kelsalls	•••		•••	•••	•••				0 16	2
Gidgee	•••	•••	•••	•••	***	•••	•••	•••	0 15	0

# YIELDS of Rate of Seeding Trials (Wheat).

Seed per Acre.	Moombooldool (P. Corcoran— Penny).	Arish Park (D. W. Edis—Union).	Woja (G. A. Wallace— Canberra).	Merriwags (T. H. Binery— Currawa).	Burgooney (Franklin & Cooke —Canberra).	Kingsvale (H. Bg King— Marshall's No. 3),	
75 lb 60 lb 30 lb	bus. Ib. 21 39 22 21	bus. lb. 20 11 21 7 20 42	bus. lb. 7 39 9 20 8 14 	bus. lb. 4 36 4 26	bus, lb.  4 28 4 27 4 54	bus. lb. 21 33 20 33 19 18	

# Northern District.

MARK H. REYNOLDS, H.D.A., Senior Agricultural Instructor.

The following farmers co-operated with the Department in conducting trials with winter cereals in 1929:—

W. Bignall, Manilla.
P. B. Pearson, Murroon.
P. Page, Duri.
Smith Pollock, Quirindi.
I. Thornton, Currabubula.
C. Scholes, Garthowan.
Forge & Sons, Oxley.
W. Smith, Warrah Creek.
G. Tongue, Loomberah.
R. Winnett, Warrah Creek.

A. H. Bielefeld, Duri.
T. & D. Scott, Currabubula.
Pankhurst Bros., Attunga.
M. Greenwood, Quirindi.
Gallagher Bros., Garthowan.
Wake Bros., Gowrie.
W. H. Lye, Loomberah.
S. R. Thrift, Parkville.
W. Bowen, Baldwin.

# The Season.

The bounteous rain of February was deeply stored by the self-mulching soils which represent perhaps 50 per cent. of the arable land of the district, and also by those areas of the remainder (light red to grey loams, fine in texture and running together and settling down after rain) on which the fallow had been commenced prior to February. This was the second season in succession that abundant rainfall occurred in February. Early autumn is at times dry in this district, and when rainfall is sparse until the spring, the combination causes failure where earlier rains have not been conserved by a longer fallow.

# RAINFALL Table.

	Œf	fective Rainfal	1.
Centre.	During fallow.	During growth.	Total.
Manilla (W. Bignall)	Points. 172 730 985 985 985 992 407 940 952 290 191 732 422 640 884 Nill 327 939	Points. 684 1,250 795 939 781 731 961 515 799 490 1,325 1,493 930 890 940 675 447	Points. 1,324 1,780 1,780 1,924 1,673 1,576 1,901 1,467 1,641 1,146 2,057 2,045 1,570 1,774 1,774 1,894 1,614 1,536

After early April seeding conditions were unfavourable, due to lack of moisture in the seed-bed, and it was not until August that ample rains fell. As the result the plants stunted, and in a number of cases the seed malted, or remained dormant partly or wholly. The outcome was uneven ripening of the crops. The rainfall of mid-October and early November caused rapid growth and serious stem rust damage in some crops, though those that got away in April were either free or but slightly damaged. The winter and early spring were the coldest for years, and frost damage occurred, especially on the level country. Flag smut reduced yields considerably, especially in Canberra, Hard Federation, Waratah, Canimbla, and Aussie, whereas Nabawa, Wandilla, and Riverina were mostly free to very slightly affected. Currawa and Pusa 4 were only a little more affected. Loose smut was too prevalent occasionally.

# Cultural Details.

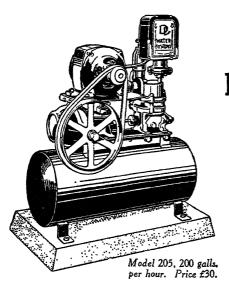
Manilla (W. Bignall).—The oat plots were on medium, deep, red soil, and the wheat plots on brown, slightly self-mulching, deep sedimentary soil; eropped for thirty years, wheat 1928; mouldboard ploughed late February when moist, harrowed 3rd April, cultivated mid-May, harrowed late May. Sown with a combine when soil was dry without fertiliser; oats on 25th April, wheat on 31st May.

There was a good strike of oats spread over two months. Some of the wheats germinated in late June and early July, some malted and the balance appeared in early August; fed off lightly in early August to retard the portion that came away in June. Flag smut was fairly prevalent in Gallipoli and Improved Steinwedel. Stem rust showed commonly after the rain in October and November. The oats, free of disease, were harvested 26th November; wheats, harvested 3rd December were lean to pinched with Nabawa the best. A reduction in yield and quality, due to rust and hot, dry winds took place on about half the wheat plot—that portion which did not germinate until early August.

Duri (A. H. Bielefeld).—The oat variety trial was on red, medium, self-mulching soil, cropped since 1910 with wheat, unfertilised; wheat in 1928; combined 4 inches on 21st January, harrowed 7th February, combined 3 inches 25th February, harrowed after rain in March. Sown with combine on 28th March, unfertilised, seed 45 lb. Fed off 15th to 23rd May, and again 21st to 28th June; little growth till early August. Harvested 12th November.

A wheat rate-of-seeding trial was abandoned because of flag smut and stem rust damage.

Murroon (P. B. Pearson).—The oat variety trial and the wheat fertiliser trial were on grey soil, 6 inches over clay, the depth of ploughing trial on grey to light red soil 6 inches over clay, and the wheat variety trial on deep, black to grey and self-mulching, sedimentary soil from basalt; not cropped 1928; mouldboard ploughed 4 inches August, combined



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G. D. ROSS, Under Secretary, Department of Agriculture. 2½ inches March, harrowed 10th April after rain. Sown with a combine; wheat variety trial on 27th April, oats on 30th April, fertiliser trial on 17th May, and depth of ploughing trial on 19th April; oat variety trial and wheat depth of ploughing trial unfertilised, wheat variety trial fertilised with 56 lb. superphosphate per acre; seeding, wheat 45 lb., oats 40 lb. per acre. A good strike resulted on all plots, but rainfall was deficient until August. The variety trials were fed off for a short period in the latter part of July. After the rain of 24th October (120 points) stem rust was very prevalent in the variety trial, and the more so on the unfertilised than the fertilised plots of Canberra. After the 135 points of rain on 10th November, the variety trial developed rust to a serious extent, and reduced a promised yield of 45 bushels to 15 bushels per acre. The remarkable increase from 84 lb. superphosphate with Canberra wheat was to a very slight extent aided by rust. The marked improvement of the fertilised plot was noticeable throughout.

The yields in the wheat depth of ploughing trial with Aussie variety were: 4 inches, 13\frac{3}{2} bushels; 5\frac{1}{2} inches, 18 bushels.

Currabubula (T. and D. Scott).—Soil, medium-heavy, slightly self-mulching, red, from shale and basalt; cropped over thirty-five years; disc ploughed 3½ inches December, cross disc ploughed mid-January, combined 3½ inches early March, combined mid-April. Sown with a combine 6th August (without fertiliser in variety trial), seed at 60 lb. per acre. A good strike resulted, but a mild rust attack occurred in November. This late crop was of great promise until ten days before mature when it was partly hayed-off with hot winds, causing lean grain generally and pinching portion of the Rajah, Gallipoli and Nabawa plots, and Wandilla to a less extent.

Duri (P. Page).—Soil, grey, light red, with red brown self-mulching at either end of the field; cropped over forty years without fertiliser; wheat 1927, maize 1928; mouldboard ploughed 4½ inches mid-February, harrowed 28th February, combined 4 inches 18th March, combined 2½ inches 16th April, harrowed 13th May. Sown with a combine 20th to 22nd May without fertiliser, seed 50 to 60 lb. per acre. A good strike resulted. In late October and early November the crop was badly affected with rust and this materially reduced the yield, the grain being pinched and light. Waratah was the best sample followed closely by Ranee.

Attunga (Pankhurst Bros.).—Soil, medium, red, 6 inches over clay, from shale; cropped for ten years without fertiliser; not cropped 1928; disc ploughed 2½ inches early November, mouldboard ploughed 4 inches when moist on 11th March; the wheat section had a further combining in early May to kill weeds. Sown with a combine; oats 18th March at ½ to 1 bushel of seed per acre, wheat 30th May at 56 lb. per acre, both without fertiliser. A good strike; oats fed off bare in June. Wheat was badly affected with stem rust in late October and early November; Penny and Exquisite were most damaged, and Canimbla least.

Quirindi (Smith Pollock).—For the rate of seeding trial with wheat, the soil was medium, black sedimentary; cropped over fifty years; oats in 1928; rigid-tyned 4 inches early March. Sown with a combine and drag harrow 3 inches deep 26th April, unfertilised. A good strike resulted from each seeding. The lighter seedings promised at least equally as well as the heavy. Comparable results were prevented by rabbits feeding off portion of the two heavier seedings, causing the maturing of these sections to be delayed; rust affected them badly, reducing the yield.

In the variety trial with wheat, the long seasoned varieties were located on black sedimentary soil; ploughed mid-January 6 inches, rigid-tyned 3½ to 4 inches early April—both dry workings. Sown with a combine 3½ to 4 inches deep into moisture on 29th and 30th April with 50 lb. seed and unfertilised.

The mid-season varieties were on black, heavy self-mulching soil from basalt; rigid-tyned 3½ inches early January, late February and 22nd-23rd April. Sown 24th May (Nabawa, Gallipoli and Cadia on 2nd May). The crop was fed off mid-June; rust and hot winds reduced the yields. Harvested 5th December; Nabawa produced the best quality and heaviest grain; the others were satisfactory, except Yandilla King which was pinched and not quite f.a.q., due largely to a portion which matured later and rusted more.

Quirindi (M. Greenwood).—Soil, red grey, deep, medium, partly self-mulching, old sedimentary formation; wheat and oats in cross-sections in 1928; rigid-tyned 3½ inches mid-February and again 4 inches deep in early April. Sown with a combine, oats on 11th April at 38 lb. per acre, wheat on 1st August at 57 lb. per acre, no fertiliser.

Currabubula (I. Thornton).—Soil, medium, self-mulching, old sedimentary; wheat in 1928 not fertilised, a light crop; disc ploughed early March 3 to 4 inches, harrowed 10th March, combined 2½ to 3 inches 15th April. Sown with a combine 6th August with 50 lb. superphosphate per acre in dry soil. Rain shortly after sowing caused a good strike. The stooling was better in the 36 lb. plot and the density was about equal to the others; the growth was better on this plot. During October the plants over a considerable area were stunted by frost, but this did not affect the comparative test. The yields were:

		Se	ed per	acre.			7	Yield.
lb.			-					bus.
51	, ,,,,		***			•••	***	104
65	•••	•••		•••	•••	•••		10 <del>1</del>
36	•••	•••	•••	•••		•••		101

Garthowan (Gallagher Bros.).—Soil, upland, grey to light red, medium, from shale; wheat in 1928, unfertilised; mouldboard ploughed 5 inches late January, disced 3½ inches 26th April. Sown with a combine 4th May, seed 60 lb., no fertiliser. Harvested 28th November.

Garthowan (C. Scholes).—Soil, upland, light red, medium, from shale; mouldboard ploughed 4 inches 7th April, springtoothed 3 inches 10th April. Sown 26th April with a springtoothed cultivator seed 45 lb., no fertiliser.

Gowrie (Wake Bros.).—Soil, red brown, heavy, self-mulching from basalt; wheat in 1928, never fertilised; disc ploughed (portion mouldboard ploughed) 3½ inches mid-February. Sown with a combine 14th May, seed 58 lb., no fertiliser; heavy harrowed day after sowing. Severely affected by rust, causing little more than the shell of each grain to be produced in all varieties tested, viz., Union, Turvey, Marshall's No. 3, Penny, Exquisite and Wandilla.

Oxley (Forge and Sons).—Soil, red brown, medium, from shale; cropped for twenty years with wheat, out for two years previous to this crop, never fertilised; disced 4 inches mid-February, harrowed and combined mid-April. Sown with a combine 24th May, seed 53 to 58 lb. not fertilised. Rust reduced the yield; Bobin and Bald Early a little pinched, the rest f.a.q. Harvested 29th November.

Loomberah (W. H. Lye).—The soil of the barley plot was light red to grey loam, and of the wheat trials, red, generally self-mulching, both from shale; cropped with wheat for over fifteen years and not fertilised. The wheat trials were springtoothed 2 inches in January, again 2½ inches in mid-February, combined 3 inches early March and again 16th April; sown with a combine. The barley trial was ploughed 4 inches deep early in February, harrowed March, disced 3 inches 23rd April, springtoothed late May; sown with a combine. The wheat was fed off and was lightly infected with flag smut and stem rust; the yield was reduced by dry, high-velocity winds in November, causing some lean and pinched grain. Improved Steinwedel shelled badly with the high winds.

The yields in the barley variety trial were: Pryor, Lansdowne, and Trabut, 29 bushels each.

Warrah Creek (W. Smith).—Soil, brown red, medium-heavy, self-mulching, from basalt; wheat and oats alternately since 1926; spring-toothed 4 inches 6th February. Sown with a combine and drag harrow; fertiliser broadcasted and harrowed under, seed 40 lb. per acre; variety trial unfertilised. Green patches delayed harvesting, resulting in lodging of matured sections. All varieties rusted considerably in late spring; Lachlan grain was lean. Harvested 27th November.

Parkville (S. R. Thrift).—Soil, grey to red loam, old cultivation; wheat unfertilised in 1927, not cropped 1928; portion disc ploughed 4 inches late January, when partly moist, the remainder early in February; again ploughed mid-March and mid-April respectively. Sown with a combine and drag harrow on 23rd April, seed 58 lb., unfertilised. The crops rusted after the October rains; Turvey, Cadia, Yandilla King and Cleveland were least affected. Harvested 28th November; all f.a.q. except Marshall's No. 3 and Penny.

Loomberah (G. Tongue).—Soil, medium-heavy, red brown to grey, from shale; cropped continuously with wheat for thirteen years, unfertilised; disc ploughed 5 inches March and cultivated 3½ inches twice, cultivated 3½ inches April. Sown 25th April, seed 46 to 60 lb.; variety trial unfertilised. Fed off continuously from early July to early September; Guyra produced the most greenstuff. Harvested 28th November; considerable quantity of grain was lost through lodging.

Baldwin (W. Bomen).—Soil, light red, setting to self-mulching, from shale; not cropped in 1928 but for several years previously; ploughed (disced and mouldboard) 3½ inches early April, harrowed mid-April. Sown with a combine 25th April; Marshall's No. 3, 60 lb., the rest 50 lb.; superphosphate 56 lb. Harvested 18th November; best samples from Nabawa and Union.

Warrah Creek (R. Winnett).—Soil, heavy black, self-mulching, from basalt; pasture prior to 1928, in which wheat unfertilised was grown for hay. Mouldboard 3½ inches late January, springtoothed 3 inches 25th February and again late February to destroy thistles, harrowed early April after 250 points of rain, springtoothed 3 inches mid-April to destroy thistles. Sown with a disc drill 18th May, seed 60 lb., no fertiliser. On the 9th December each variety was severely rusted; on this date the crop was not quite mature.

YIELDS of Wheat Variety Trials.

			Manilla (W. Bignall).	Murroon (P.B. Pearson).	Currabubula (T. & D. Scott).	Loomberah (W. H. Lye).	Baldwin (W. Bomen).	Parkville (S. R. Thrift).	Gallagher Bros).	Oxley (Forge and Sons).	Quirindi (Smith Pollock).—	Qubrindi (M. Green- wood).	Duri (P. Page).	Attunga (Pankhurst Bros).
*Yandilla Kir Canimbla Wandilla Penny Exquisite Cadis Turvey Marshall's N Cleveland Currawa Union *Nabawa Union *Waratah Canberra Aussie Gullien Tusa 4 Greeley Bald Early	co. 3		bus	bus. 15 22 17 18 9 20 16 16 17	bus	bus. 234 204 202	bus 17½ 15½ 20½ 15½ 15½	bus. 191 161 192 201 189	bus	bus	bus. 141 16 16) 14 11 21	bus,	bus,	bus. 22 10 11 11 11 11 11 11 11 11 11 11 11 11
Nizam Rance Bobin Dwri		::;		  					22 20½ 	12½  14 10	· ::: :::	ii  	15 71 13	

<sup>\*</sup> Standard varieties.

# YIELDS of Oat Variety Trials.

		Sunrise.	Myall.	Buddah.	Fulghum.	Mulga.	Gldgee.	Palestine	Belar.	Guyra.	Algerian.	Lachlan,	Kelsull'n.
Manilla (W. Bignall) Duri (A. H. Bielefeld) Currabubula (W. B. Donalds Loomberah (G. E. Tongue) Garthowan (C. Scholes) Murroon (P. B. Pearson) Quirindi (M. Greenwood)	son) .	,	24 	24  24 	28    18	 32 29	201 161 	234	40 18½ 24 37 27⅓ 30 37 26 20	34 34 221  201	212 263 29 31 <u>1</u> 33 <u>1</u>	32  17½ 32½ 26	::: ::: ::: ::: ::: :::

# YIELDS of Oat Fertiliser Trials.

Fertiliser per acre.	Warrah Creek (W. Smith— Gidgee).	Loomberah (G. E. Tongue —Algerian).
Superphosphate, 112 lb Superphosphate, 82 lb	1	bus.  29‡
No manure	. 201	29

# YIELDS of Wheat Fertiliser Trials.

Fertil	liser pe	r acre.		Murroon (P.B. Pearson —Canberra).	Currabubula (T. & D. Scott —Wandilla).
Superphosphate,	84 lb.	,	 •••	bus. 24½ 7½	bus. 26§ 25}

Rate of Seeding.—Because of faulty strike or stem rust damage, only one of the trials was considered comparable, and this showed the yield of the 36, 51 and 65 lb. seeding per acre to be about the same.

General.—The high-yielding properties of Canberra, Waratah, Hard Federation and Aussie wheats make it advisable that they should be continued, though all are flag smut and stem rust liable. To minimise flag smut infection it is suggested that these varieties should be grown on land: (a) long fallowed (for a season), (b) after oats or other crop than wheat, (c) after Nabawa wheat. To minimise the risk of rust they should be sown as early as risk from frost will permit, and if necessary controlled by feeding off.

# Comment.

Of long season varieties of wheat the standard variety, Yandilia King, is more rust liable than Canimbla, while of mid-season varieties Nabawa (the standard) is still the best of those tested.

Waratah remains the best short season variety of wheat; it was surpassed by Aussie in the only test with this latter variety.

Out Varieties.—Guyra, on acount of prolific early growth, is gaining in favour. Belar, Algerian and Mulga continue good all-round varieties.

Barley Varieties.—The single trial indicated how suitable the district is for barley.

Fertilisers.—The outstanding increase of 17 bushels per acre at W. P. B. Pearson's trial on light red to grey loam should interest farmers on similar country.

Depth of Initial Ploughing.—The 5½-inch deep ploughing plot showed an increase of 4 bushels per acre.

# North-western District.

# J. A. O'REILLY, H.D.A., Agricultural Instructor.

Wheat and oat variety trials were conducted throughout the north-west during the past season in conjunction with branches of the Agricultural Bureau, and in those localities where there is no branch of the Bureau the trials were conducted with private farmers.

Trials were conducted with the following farmers—the name of the Bureau branch is shown in parenthisis:-

# Wheat Variety Trials.

G. L. Howson, "Black Rock," Bingara (Hall's Creek).

J. B. White, "Braymont," Boggabri (Braymont).

A. Gett, "Glenville," Narrabri (Deep Creek).

V. Pilditch, Narrabri (Eulah Creek).

S. Carberry, "Cadarga," Narrabri (Culgoora).

N. Barrett, "Yera," Edgeroi.

C. Evans, "Hamel," Boggabri (Wynella).

F. Anderson, "Merrylands," Boggabri (Willala).

W. L. Laird, "Roslyn," Boggabri (Willowdale).

A. H. Donaldson, "Bunker Hill," Gunnedah (Normanstone Well).

J. Barwick. "Carellan." Gunnedah (Kelvin). A. H. Bonatson, "Carellan," Gunnedah (Kelvin).

A. H. Campbell, "Beulah," Gunnedah (Mary's Mount).

L. G. Pryor, "Eriston," Gunnedah (Nobby Rock).

D. M. Leys, "Beckworth," Boggabri (Dunnadee Creek).

J. McDonald, "Bonnie Doon," Moree.

A. M. Paterson, "Green Hills," Delungra (Myall Creek).

B. Berker Morth Breefl (Morth Profil). R. Beneke, Mount Russell (Mount Russell). W. Gilholm, Inverell (Gum Flat).
H. A. Scott, Inverell (Nullamanna).
A. W. Pulsford, Inverell (Auburn Vale).
E. Rankin, Inverell (Auburn Vale). E. Rankin, Inverell (Oakwood).
A. L. Marr, "Pyne View," Carroll (Carroll).
W. O. Manning, "The Pines," Curlewis (Nea Siding).
W. K. Campbell, "Fassifern," Boggabri (Nandewar). S. Rigby, "Gwyroi," Pallamallawa.

# Oat Variety Trials.

- A. E. Richards, Snowden, Narrabri (Deep Creek).
  C. C. Abbott, "Herndale," Boggabri (Nandewar).
  G. L. Howson, "Black Rock," Bingara (Hall's Creek).
  J. Newnham, "Red Lands," Wee Waa (Wee Waa).
  J. Cavanagh, "Roan Oak," Curlewis (Nea Siding).
  R. P. Greer, "Uralba," Emerald Hill (Emerald Hill).
  D. M. Leys, "Beckworth," Boggabri (Dunnadee Creek).
  S. Thomas, Inverell (Gum Flat).
  F. Mills, "Dalkey," Mount Russell (Mount Russell).
  A. Page, "Moorakyne," Inverell (Oakwood).
  P. J. Gearing, "Cave Farm," Inverell (Nullamanna).
  J. Neuss, Inverell (Bannockburn).

- J. Neuss, Inverell (Bannockburn).
  J. R. Boyer, "Lone Pine," Boggabri (Wynella).
  A. Orman, Narrabri (Eulah Creek).
- J. A. Laird, "Willowdale," Boggabri (Willowdale).
- K. Bailey, Narrabri (Culgoora). J. T. Manndeer, "The Wilgas," Pallamallawa.

# The Season.

The season throughout the north-west was unusual. The December-January period was dry, and though these conditions were relieved by fairly general rains in February these rains were not backed up, and the interval between them and the rains of April was dry, so that the amount of work necessary on the fallows was almost negligible. The conditions which prevailed from April till beginning of June were responsible for an erratic, retarded germination. Hardly a fall of rain sufficient to promotegermination was received during this period, and the rains of April were of little avail for the germination of late-April and May sowings.

Conditions varied somewhat throughout the district from June onwards, as a result of useful rains in the first week of that month. The sections of the district which benefited most from the June rains were Moree, Inverell, Wee Waa, Narrabri, and Boggabri. Late-April and May sowings were germinated thereby, and early-April sowings, which had not rooted up till the end of May, became firmly established and in many cases were grazed a fortnight after.

In those sections of the districts where these June rains were not soheavy the early germinated crops suffered severely from dry conditions and frost during June and July, and those which had partially germinated were not improved till sufficient rain was received in August to complete the germination.

At Moree, Narrabri, Wee Waa, Inverell and Boggabri the crops mostly went ahead after the middle of June, whilst those at Gunnedah were very backward and were not materially changed till useful falls were recorded in August.

Light showers from August onwards brought the crops to a successful issue, and generally satisfactory yields were obtained.

The sowing of the trials was on the late side, and the germination and stand were as the season dictated.

te dream at various Gentles.													
		Gunnedah Post Office.	Curlewis. (J. Cavanagh.)	Kelvin Post Office.	Boggabri, (J. B. White.)	Boggabri. (C. C. Abbott.)	Narrabri Post Office.	Turrawan. (R. J. McWillams.)	Moree Post Office.	Moree. (J. McDonald.)	Wee Waa Post Office.	Inverell Post Office.	Bingara Post Office.
January February March April May June July August September October November December		fpts. 109 533 56 234 28 57 76 190 97 84 195 61	pts. 72 302 31 216 3 18 57 176 90 77 	pts. 132 607 80 201 13 148 65 230 109 154 180 82	pts. 66 308 75 248 26 92 62 179 88 133 97	pts. 20 175 55 310 15 110 113 210 92 144 105	pts. 87 511 121 688 11 181 107 149 118 225	pts. 72 306 49 425 0 119 64 142 67 101	pts 163 515 35 32 61 160 129 245	pts. 190 248 234 401 0 71 41 145 53 200 	pts. 59 233 36 554 1 117 61 80 69 82	pts. 93 493 233 467 29 104 66 195 124 472	pts. 109 661 133 631 0 131 74 416 201 312 117 
Total	•••	1,720	1,042	2,001	1,374	1,349	2,198	1,345	1,340	1,583	1,292	2,276	2,785

RUNFALL at Various Centres.

# Cultural Details of Wheat Variety Trials.

Bingara (Hall's Creek).—Soil chocolate loam; disc ploughed January, 1929, springtoothed April, springtoothed and harrowed May. Sown with a disc drill 22nd May and harrowed after; no manure; seed 45 lb. per acre. Germination not complete till rains in June.

Boggabri (Braymont).—Soil greyish to black clay loam, self-mulching tendencies; previous crop wheat 1927; mouldboard ploughed August, 1925, springtoothed February and March. Sown with combine 6th May; seed 45 lb. per acre; no manure. Germination excellent. Canberra and Waratah were slightly affected by tree in close proximity to plots.

Narrabri (Deep Creek).—Soil red medium to sandy loam; previous crop wheat 1928; disc ploughed December, 1926; springtoothed March, April and May. Sown 31st May with combine; seed, 45 lb. per acre; no manure; seed-bed in good order; germination excellent.

Narrabri (Eulah Creek).—Soil light, sandy loam; cropped with wheat for twenty years; previous crop 1928; disced January, 1929, springtoothed March and April; sown 10th June with combine; seed 50 lb. per acre, without fertiliser.

Narrabri (Culgoora).—Soil greyish to black loam carrying belar; previous crop wheat 1928; disc ploughed December, 1928; springtoothed February, harrowed March, springtoothed and harrowed May. Sown 4th June with combine; seed 51 lb. per acre. Good rains followed sowing; germination excellent.

Narrabri (Edgeroi).—New land; chocolate loam; disc ploughed March. Sown with combine 28th April; seed 45 lb. per acre; no manure.

Boggabri (Wynella).—Soil sandy loam, cropped with wheat last year; disc ploughed January, 1929, springtoothed April. Sown with combine on 7th June; seed 58 lb. per acre; no manure. Germination was good. Yields in this trial were light, due to late sowing and effect of rust.

Boygabri (Willala).—Soil chocolate loam; second year in wheat; previous crop wheat 1928; disc ploughed February, springtoothed and harrowed April. Sown with combine 9th May; seed 48 lb. per acre; no manure.

Bogyabri (Willowdale).—Soil chocolate loam; cropped with oats last year; disc ploughed January, 1929; springtoothed March. Sown with combine 15th June; seed, 50 lb. per acre, without fertiliser. Gresley, Canberra and Clarendon were tipped by late frosts.

Gunnedah (Normanstone Well).—Soil, red to chocolate loam; cropped with wheat 1928; disced March, springtoothed end of April. Sown with combine 16th May; seed 45 lb. per acre, without fertiliser. Yields were effected by faulty germination and susceptible varieties were damaged by flag smut.

Gunnedah (Kelvin).—Brown loam with greyish to red patches; cropped with wheat 1928: mouldboard ploughed February 1929, springtoothed April and harrowed. Sown with combine 21st May; seed at 45 lb. per acre; no manure. Excellent germination resulted. Yields of susceptible varieties were reduced by rust.

Gunnedah (Mary's Mount).—Soil free working, red to chocolate loam; previously timbered with belar; previous crop wheat 1928; springtoothed January, February, and March, 1929. Sown with combine 17th May; seed 45 lb. per acre, without fertiliser. Germination was faulty; not completed till August.

Gunnedah (Nobby Rock).—Soil brownish to chocolate loam; previous crop wheat 1928; disc ploughed February, springtoothed April. Sown with combine 20th May; seed 45 lb. per acre, without fertiliser. Germination was not completed till August. Except for Watchman the grain was slightly pinched.

Boggabri (Dunnadee Creek).—Soil medium red to sandy loam; cropped with wheat 1928; disc ploughed February, 1929, and again lightly in April. Sown with combine 9th May; seed 45 lb. per acre, without fertiliser.

Moree (J. H. McDonald).—Soil greyish loam; previously timbered with belar, brigalow; previous crop wheat 1928; rigid-time scarified January, 1929, harrowed February, scarified February, harrowed twice in March, springtoothed May. Sown with combine 7th June; seed 45 lb. per acre, without fertiliser.

Delungra (Myall Creek).—Soil black basaltic loam; cropped with wheat since 1917; wheat, 1928; ploughed 4 inches April, 1929, harrowed May. Sown with combine 24th July; seed 45 lb. per acre; no manure. Rust followed by dry conditions towards the maturing period was responsible-for pinched grain and low yields from mid-season and late-maturing-varieties.

Mt. Russell (Mt. Russell).—Soil, red loam; cropped to wheat last season; springtoothed January, 1929; harrowed March, springtoothed April. Sown with disc drill 10th June; seed 55 lb. per acre, without fertiliser. The grain of Exquisite pinched.

Inverell (Gum Flat).—Soil, red basaltic loam; cropped with wheat, 1928; disc ploughed April, 1929, and harrowed three times prior to sowing. Sown with combine 13th June; seed 58 lb. per acre, without fertiliser; rolled after sowing.

Inverell (Nullamanna).—Soil, red to chocolate loam; been in cultivation for thirty years; cropped with wheat, 1927; ploughed April, 1928, harrowed June, skim ploughed January, 1929, harrowed February, springtoothed April. Sown with combine 13th May; seed 60 lb. per acre, without fertiliser.

Inverell (Auburn Vale).—Soil, black basaltic loam; sown with maize 1927; fallow, 1928; mouldboard ploughed March, 1929; harrowed April, disced May; sown with disc drill 1st June; seed 50 lb. per acre, without fertiliser.

Inverell (Oakwood).—Soil, black basaltic loam; cropped with wheat, 1928; mouldboard ploughed January, 1929, harrowed three times prior to springtoothing in May. Sown with combine 11th June; seed 61 lb. per acre, without fertiliser. Exquisite was badly pinched.

Gunnedah (Carroll).—Soil, chocolate to greyish gravelly loam. Sown with wheat 1928; disc ploughed January, 1929, disced again in April and harrowed. Sown with combine on 15th May; seed 45 lb. per acre, without fertiliser. Germination was slow and was not completed till August.

Curlewis (Nea Siding).—Soil, medium to sandy loam; cultivated for thirty years; previous crop oats; fed off till September, 1928; disced November, 1928, again in February, 1929, harrowed April. Sown with combine 7th May; seed 43 lb. superphosphate 30 lb. per acre. Plots were sown one month after rain and an excellent germination resulted.

Pallamallawa (S. Rigby).—Soil, greyish belar loam; cropped with wheat 1928; mouldboard ploughed February, 1929, rigid-tined April. Sown with combine 6th May.; seed 45 lb. per acre, without fertiliser. Union was pinched, due to rust infection.

Boggabri (Nandewar).—Soil, greyish loam; cropped with wheat 1928; mouldboard ploughed February, 1929, springtoothed May. Sown 5th June with combine; seed 45 lb. per acre, without fertiliser.

# Notes on Wheat Varieties.

The determination of the most suitable varieties for the various sections of the district, from the results of these trials, has not yet been accomplished. The behaviour of varieties is influenced by soil, climate, and season, and whilst a variety may yield consistently well, there is the unusual season in which it will excel itself or vice versa. This alone is a factor which makes the keeping of the number of varieties grown down to a

minimum to suit all requirements—a difficult matter. The varieties which have yielded consistently during the past two seasons are Aussie, Canberra, Canimbla, Cleveland, Clarendon, Duri, Ford, Bobin, Hard Federation, Nabawa, Union, Waratah, Wandilla and Ranee.

Although liable to flag smut and susceptible to rust, Aussie is yielding well with Canberra and Waratah.

Canberra yielded well where tried, and in most instances matured a good plump sample of grain.

Canimbla is worthy of further trial in the Inverell district. At Gum Flat and Delungra it was superior to Cleveland.

Cleveland is still a serviceable variety for early sowing at Inverell.

Clarendon yields consistently well throughout the district, although it does not seem capable of yielding heavily.

At Delungra it yielded 43 bushels per acre. This was due to its rust-escaping qualities and the late planting of the trial. At Moree, Curlewis, and Oakwood it was outyielded by Canberra.

Duri has yielded well for the past two seasons. In five tests with Canberra it proved superior to its parent—in four cases to extent of up to 2 bushels.

Ford is a promising variety from South Australia. At Kelvin it yielded 23 bushels as against 24 from Nabawa, the time of sowing favouring the later variety. It has a tendency to produce a large bulk of straw, but this can be overcome by judicious feeding off in the early stages of growth. This variety makes quick early growth and shows a good deal of resistance to rust. At Carroll it showed a tendency to shatter, whilst at Narrabri over a fairly large area it yielded 40 bushels per acre, and this weakness was not very noticeable. It matures an attractive sample of grain.

Bobin has yielded well throughout the trials, but in some instances it did not fill a good plump sample. It appears to finish better on lighter loams than on heavier class of country. It is susceptible to rust, but a slightly earlier sowing would reduce damage from this disease

Hard Federation has yielded consistently well, and particularly on lighter soils is a most useful variety. Tested in eight trials with Canberra it excelled that variety four times.

Nabawa repeated its success of last season. By virtue of its flag smut resistance it was easily the best variety in the trial at Normanstone Well in the Gunnedah district. It has proved itself to be a consistent yielder.

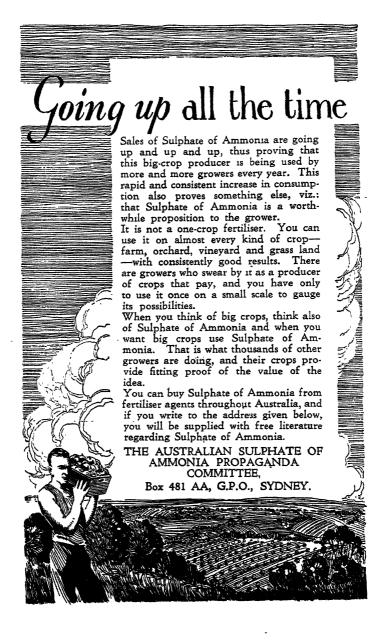
Union has proved itself a useful variety. It is susceptible to flag smut and rust, but despite this weakness it has yielded satisfactorily. It did not yield as heavily as Nabawa this season. In five tests it outyielded that variety once by 2 bushels.

Waratah still maintains its position in the recommendation of varieties for the district. It did not yield quite as well as Canberra this season. In twelve tests Canberra outyielded it on seven occasions.

Curlewis (W. O. Manning).

Carroll (A. L. Mari).	12 4.86 13 15 18 18 18 18 18 18 18 18 18 18 18 18 18
(S. Kigby).	10
Pallamallaws (wdnift 2)	22 26 20 27 28 28 29 27 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29
Inverell (E. Eankin).	31. The control of th
Inverell (A. W. Pulsford).	P. II. 19. 19. 19. 19. 19. 19. 19. 19. 19. 19
Inverell (H. A. beott).	28 28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29
Inverell (W. Gilholm).	52 52 1 1 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Mt. Russell (R. Bencke).	24 52 111 119 119 119 119 119 119 119 119 11
Delungra (A. M. Paterson).	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
(1. McDonald).	1 2 3 3 1 1 3 3 1 1 1 1 1 1 1 1 1 1 1 1
(D. M. Leys). Moree	4°:°:°::::::::::::::::::::::::::::::::
Eoggabri (D. M. Leys).	1 P P P P P P P P P P P P P P P P P P P
Gampedah. (A. H. Campbell).	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	6 5 4 7 6 15 8 15 8 15 8 15 8 15 8 15 8 15 8 15
Gunneusu (J. Barwick)	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Arbenard (A. H. A)	144 121 111 111 111 111 111 111 111 111
Boggabri (W. K. Campbell).	\$08
Boggabri (W. L. Laird).	14 14 14 17 19 19 19 19 19 19 19 19 19 19 19 19 19
Boggabri (F. Anderson).	26 58 58 58 58 58 58 58 58 58 58 58 58 58
Boggabri (C. Evans).	5 4 6 6 40EE
Edgeroi (N. Barrett).	6 22 24 42 25 25 25 25 25 25 25 25 25 25 25 25 25
Namedri (S. Carderry).	286 458 458 458 458 458 458 458 458 458 458
Narrahri (V. Pilditch).	17. 17. 18. 18. 18. 18. 19. 19. 19. 19. 19. 19. 19. 19. 19. 19
Narrabri (A. Gett).	22 6 9 22 24 24 24 24 24 24 24 24 24 24 24 24
Boggsbri (J. B. White).	
Eingara (G. L. Howson).	28 27 17 18 28 28 27 17 18 28 28 28 28 28 28 28 28 28 28 28 28 28
	::::::::::::::::::::::::::::::::::::::
Variety	Austle Bald Harly Bohn Bons Ganberra Canberra Canberra Canberra Canberra Canberra Canberra Canberra Canberra Charla Claveland Currawa Duri Early Hird Exquisite Ford Currawa Herd Gallypoli Gluyas Earl Gressley Gillen Hard Ford Consa Marshall's No. 4 Eusa

YIELDS of Wheat Variety Trials.



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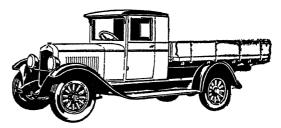
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Wandilla is a useful variety for early sowing. It is a consistent yielder, very resistant to flag smut, but liable to be damaged by rust.

Ranee behaved satisfactorily for the past two seasons, and is useful for mid-season and late sowing.

#### Wheat Diseases.

Owing to late sowing of some of the trials, susceptible varieties were damaged to a certain extent by rust.

Flag smut was not as prevalent as might have been expected in a season when conditions were comparatively dry during summer and autumn months. Yields at Normanstone Well, Gunnedah, were seriously reduced as a result of flag smut infection. Foot-rot was noticeable in Canberra at Oakwood. The sample of grain was slightly pinched, but apart from this no severe loss was occasioned by this disease.

#### Cultural Details of Oat Variety Trials.

Narrabri (Deep Creek).—Soil, semi-alluvial loam; cropped with wheat 1928; disc ploughed March, springtoothed April. Sown with disc drill 15th April; seed 40 lb. per acre; without fertiliser. Algerian failed for grain and was cut with binder.

Boggabri (Nandewar).—Soil, sandy loam on creek flat; previous crop was wheat 1928; fed off; ploughed December, 1928, springtoothed January, harrowed February, disced lightly in April; harrowed and sown with combine 1st May; seed 40 lb. per acre; without fertiliser.

Bingara (Hall's Creek).—Soil, black to chocolate loam; fallowed (disc ploughed) June, 1928, springtoothed January, 1929. Sown with springtooth and harrowed 24th May; seed 40 lb. per acre; without fertiliser. Guyra was lodged to such an extent that it was impossible to gather all with harvester.

Wee Waa (Wee Waa).—Soil, red sandy loam; cropped with wheat 1928; disc ploughed March and again lightly prior to sowing. Sown with disc drill 9th May; seed 40 lb., superphosphate 45 lb. per acre.

Curlewis (Nea Siding).—Soil, chocolate loam; cropped with wheat last year; rigid-tyne scarified March, 1929, and springtoothed same month. Sown with combine 10th April; seed 40 lb. per acre; without fertiliser. Buddah shelled somewhat.

Emerald Hill (Emerald Hill).—Soil, medium to strong red loam; cropped with wheat 1928; springtoothed February, 1929, and again in March, rigid-tyned April. Sown with disc drill 13th April; seed, 50 lb. per acre; without fertiliser. Germination was slow and yield of plots was light.

Boggabri (Dunnadee Creek).—Soil, medium red to sandy loam; cropped with wheat 1928; disc ploughed April. Sown combine 6th May; seed, 2 bushels per acre; without fertiliser.

Inverell (Gum Flat).—Soil, black to red basaltic loam; cropped with wheat last year; disc ploughed January, 1929, springtoothed March; sown with combine 15th April; seed, 48 lb. per acre; without fertiliser. This trial was fed off late and the more palatable varieties were rather close and did not respond later as did those which were not eaten so closely.

Mt. Russell (Mt. Russell).—Soil, red basaltic loam; previously growing lucerne; mouldboard ploughed February, 1929, and again in May. Sown with disc drill 14th May; seed, 40 lb. per acre; without fertiliser.

Inverell (Oakwood).—Soil, red to black basaltic loam; cropped for a number of years; previous crop wheat 1928; rigid-tyned February, 1929, again in May and June, harrowed after each working. Sown with disc drill 21st June; seed, 40 lb. per acre; without fertiliser. Germination was good throughout.

Inverell (Nullamanna).—Soil, chocolate loam; previously cropped with maize; stalks removed and land springtoothed prior to sowing on 23rd April; seed 40 lb. per acre; without fertiliser.

YIELDS of Oat Variety Trials.

	_	Algerian.	Buddah.	Belar.	Gidgee.	Guyra.	Lachlan.	Mulga.
NT1!		bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.
Narrabri (A. E. Richards.)	•••	***	20 25	29 37	•••	27 20	20 7	23 👝 9
70 1	•••	27 31	29 29	32 8	21 2	30 5	18 31	34 8
Dia	•••		25 0	30 0	•••	14 4	<b>34</b> 8	18 8
(J. Newnham.)	•••	24 39	16 ₹9	21 37	20 0	21 21	16 26	19 14
Curlewis (J. Cavanagh.)		34 28	18 10	38 32	22 22	23 <b>3</b> 9	31 21	39 6
Emerald Hill (R. P. Greer.)	•••	12 15	12 31	12 32	12 3	18 35	15 9	15 28
(D. M. Leys.)	•••	12 0	12 0	13 0	11 0	14 0	14 0	12 0
(S. Thomas.)	•••	47 0	•••	42 20	•••	43 5	34 14	29 29
(F. Mills.)	•••	63 14	33 17	51 15	•••	66 18	59 21	50729
Inverell (A. Page.)	•••		28 5	36 5	•••	29 15	35 10	30 1
Boggabri (J. A. Laird.)	•••		14 25	15 22	23 16	15 11	13 34	20 22
Inverell (P. J. Gearing.)	•••		18 0	***	•••	27 0	27 0	22 0
Inverell (J. Neuss.)	•••	82 37	46 13	48 31		78 23	66 26	44 4
Boggabri (J. R. Boyer.)	•	19 20	12 0	19 20	16 20	19 20	16 20	16 20
Narrabri (A. Orman.)	•••		33 20	•••	•••	45 0	34 9	41 0
Narrabri (W. K. Bailey.)	•••	23 17	18.7	22 31		15 8	22 8	22 26
		,			The second			

Inverell (Bannockburn).—Soil, chocolate loam, basaltic; previous crop wheat, 1928; mouldboard ploughed January, 1929, half paddock spring-toothed; whole area springtoothed March. Sown with combine 16th April; seed, 40 lb. per acre. Germination was excellent. Plots were fed off for one week at the end of June.

Boggabri (Wynella).—Soil, red loam; cropped with wheat 1928; disc cultivated March. Sown with combine 26th April; seed, 40 lb. per acre; without fertiliser.

Narrabri (Eulah Creek).—Soil, semi-alluvial loam; cropped with wheat 1928; disc ploughed February, 1929, springtoothed prior to sowing with combine 10th May; seed, 40 lb. per acre; without fertiliser.

Narrabri (Culgoora).—Soil, sandy loam; cropped with wheat last season; disc ploughed June, 1929; springtoothed twice. Sown with combine 18th July; seed, 40 lb. per acre; without fertiliser. All varieties except Buddah benefited by late rains, Buddah being too far advanced to be improved; Guyra lodged.

Boggabri (Willowdale).—Soil, sandy loam; cropped half with wheat and half oats 1928; disc ploughed February and stocked till sowing. Sown with disc drill 16th June, 1929; seed, 1 bushel per acre; without fertiliser.

Pallamallawa.—The results in the oat variety trial at this centre were not comparable with those at other places, and consequently the yields obtained and the cultural details employed have been omitted from this report.

#### Notes on Oat Varieties.

Some phenomenal yields of oats were obtained in the district. The most serviceable varieties are Mulga, Buddah, Guyra, and Belar. The choice of a variety depends on requirements, but these varieties fill the bill when early feed is wanted, with the prospect of cutting for hay and stripping for grain. The oat grain throughout was an excellent sample.

#### Federal Capital Territory.

JOHN L. GREEN, H.D.A, Agricultural Instructor.

A wheat trial was conducted with Mr. E. Shumack, "Kiora," Yass-road, Canberra, during the past season. The area was very regular, the soil being a medium, red, clay loam. The paddock used for the trial has been cropped to wheat and oats for forty years, the last crop being oats for hay in 1927. The plot was mouldboard ploughed 5 inches in September, 1928, cross springtoothed in February after a long dry spell, cross harrowed 3rd April. Sown on 12th April, seed 65 lb. and superphosphate 84 lb. per acre.

The rainfall from fallowing in September to sowing was 1,156 points, and from sowing until harvesting was 650 points. Federation, Union, Canberra, Waratah, and the manured plots in the manurial trial were harvested on 20th December; the remainder of the plots were harvested on

4th January. Between these two dates over 3 inches of rain fell, causing some of the varieties, particularly Gresley and Cadia, to shell badly; also the no-manure plot had the yield reduced by about 3 bushels per acre, but even this placed it many bushels behind the manured plots.

The yields in the variety trial were:-

Variety.			Yield.			1	Vari		Yield.			
				bus.		1		-			••	_
	Union			33	57	i	Wandilla		•••		28	3
	Federation	•••		33	7	- (	Turvey	•••			26	33
	Yandilla King			32	0		Cleveland				26	7
, ,	Waratah			29	57	]	Cadia	•••	•••		24	20
	Canberra			29	20		Currawa		•••		22	27
	Marshall's No. 3			29	7	1	Gresley	•••	•••	•••	18	40

In the manurial trial, in which the variety was Waratah, the yields were:—

	Treatment.					
					bus.	lb.
112 lb. supe	erphosp	hate per acre			37	2
56 lb.	,,	٠,,	•••		31	43
No manure					17	3

#### Comment.

The yields in the variety trial show the earlier varieties to have been better suited by the season; Federation, Waratah and Yandilla King, varieties popular around Canberra, also yielded among the best four, indicating that their popularity is correctly placed. Union, the variety that gave the heaviest yield, is similar to Federation in maturity and growth. At present no farmers in the territory are growing it.

The manurial trial gave outstanding results, the difference between the plots being observable from germination onwards. The manured plots were ready to harvest twelve days earlier than the unmanured plot.

An outstanding feature about these trials was the absolute freedom from disease; only one plant was found attacked by flag smut, and other diseases were entirely absent. Seed is regularly treated with bluestone for bunt, but growers would be well-advised to adopt the dry pickle with copper carbonate.

#### INFECTIOUS DISEASES REPORTED IN FEBRUARY.

THE following outbreaks of the more important infectious diseases were reported during the month of February, 1930:—

Anthrax	•••				2
Blackleg					4
Piroplasmosis (tick fever)	***				Nil.
Pleuro-pneumonia contagiosa	•••	•••	•,•		-5
Swine fever		***	•••		Nil.
Contagious pneumonia		* ***		•••	1

-MAX HENRY, Chief Veterinary Surgeon.

### Fat Lamb Trials, 1929.

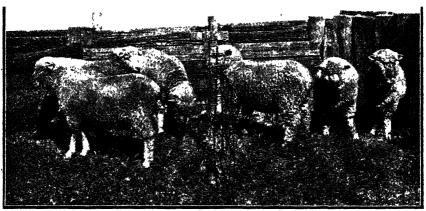
COWRA AND BATHURST EXPERIMENT FARMS.

J. M. COLEMAN, Senior Sheep and Wool Instructor.

#### The Cowra Trials.

For a number of years past the breeding flock for the lamb-raising experiments at Cowra Experiment Farm has consisted of crossbred ewes, while Dorset Horn and Ryeland rams were used with the object of ascertaining the most suitable cross for the production of exportable fat lambs within the agricultural belt and more favoured areas of the State.

It has been generally recognised that the crossbred ewe undoubtedly produces the best fat lambs, but the fact that she will not mate until considerably later than Merino and comeback ewes is justly considered by many breeders to be a very serious drawback, particularly when certain feed conditions have to be considered and markets have to be catered for at a particular period.



Lambs from Merino Ewes,
Left: Dorset Horn x Merino. Right; Ryeland x Merino.

Because of the importance of this factor on the fat lamb industry generally, a very interesting experiment was conducted at Cowra Experiment Farm during the year 1929. Equal numbers of Merino, comeback and crossbred ewes were mated with Dorset Horn and Ryeland rams, to ascertain the most profitable foundation breeding ewe for the mixed farmer, taking all conditions into consideration. The ewes were of excellent type—certainly no finer lot of ewes (Merino, comeback, or crossbred) could have been procured within the State.

The mating period was much longer than the customary six or eight weeks, in order that the period at which the various breeds of ewes will mate, could be carefully recorded.

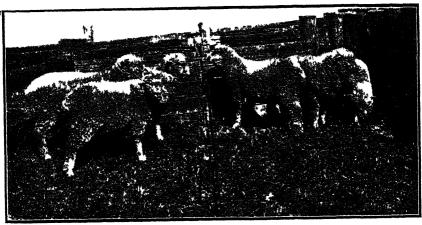
One very important factor connected with lambing mortality especially is the age of the ewes at the commencement of the trial. The comebacks and crossbreds were maiden 2-tooth ewes, and the Merinos were 4- and 6-tooth and were not maidens.

The	particulars	of	the	mating	are	as	follows:-
4 110	Day of Caraca	·	U.L.				

Mating Period.	Breed of Ram.	Percentage of Rams	Breed of Ewe.	Number of Ewes.
17-11-28 to 10-4-29	Dorset Horn Dorset Horn Dorset Horn	$\frac{2\frac{1}{2}}{21}$	Merino Comeback Crossbred	75 76 74
17-11-28 to 10-4-29	Ryeland Ryeland Ryeland	$2\frac{1}{2}$	Merino Comeback Crossbred	75

#### The Pastoral Conditions.

Feed conditions for the entire period of the experiment were much below normal; in fact, the season was regarded by many as being the most severe for many years and feed was sparse at all times. The two groups were



Lambs from Comeback Ewes. Right. Ryeland x Comeback. Left: Dorset Horn x Comeback.

grazed as one flock after the mating period, the feed available being ordinary pastures and stubbles. Some lucerne was available during July, and the lambs were topped for a few weeks in September on lucerne and for a few weeks during October on an oat crop.

#### The Lambing.

Lambing commenced on 19th April, 1929, among the Merino ewes and continued until 12th September, 1929.

The following table should be of much interest to lamb breeders, as it shows the tendency of the different types of ewe to mate at varying periods. One column gives the exact time of marking, while the other gives the approximate time of service.

MATING Tendency as shown by Proportions of Lambs Marked in Different Months.

		*Approximate			Number	Numbers of Lambs Marked.				
Breed of Ra Used.	m	Month of Service.	Month of Marking.	From Merino Ewes.	From Comeback Ewes.	From Crossbred Ewes.				
Dorset Horn	{	December January February March April	June July August	•••	35 4 18 10 6	30  18 10 4	2  16 37 10			
Ryeland	{	December January February March	June July August		39 12  1	50 10 4 2 1	29 27 			

<sup>&#</sup>x27;The lambs were marked at the age of about two weeks, and the month of service was estimated approximately.

This table confirms previous experiences regarding the tendency of the crossbred ewe to be a shy breeder during the early summer. The comeback ewe, it will be noted, mated extremely early, but that is to be more or less



Left: Dorset Horn x Crossbred. Right: Ryeland x trossbred.

expected in the Cowra district in which the climate is comparatively mild. Taking the wheat belt generally the comeback would not mate until two or three weeks later in the majority of cases.

The second table shows the results of the lambing, and the outstanding fact is the amount of assistance required by the Merinos at parturition in comparison with the comebacks and crossbreds. This fault in the Merino ewe is the more serious because the Merinos were 4- and 6-tooth ewes. whereas the comeback and crossbred ewes were maiden, 2-tooth ewes. The mortality at lambing was also higher with the Merino ewes. Another outstanding feature, shown in this table, is the excellent percentage of lambs born and marked from the Dorset Horn-Merino cross. Generally speaking, the Merino ewe does not give as high a percentage of lambs as the comeback and crossbred ewe and twins are rarer with Merinos.

#### DETAILS of Lambing.

Breed of Ram.	Type of Ewe.	Ewes Died Prior to Lamb- ing.	Ewes Died during Lamb- ing.	Ewes Assisted at Lamb- ing.	Lambs Born Dead or Died before Mark- ing.	Total Number of Lambs Born.	Number of Lambs Marked.	of	Per- centage of Lambs Marked.
Dorset Horn {	Merino Comeback Cross bred	1	4  1	24 1 2	14 5 1	87 67 66	73 62 65	per cent 116° 88·1 89·1	per cent 93.7 81.5 87.8
Ryeland {	Merino Comeback Cross bred		4 1 1	20 	10 4 6 ·	63 71 66	53 67 60	\$5·1 94·6 88•	71·6 89·3 80·

#### The Market Results.

The lambs were marketed in two drafts, and were not prime owing to seasonal conditions. In the final table it will be noticed that many lambs were not marketed. This was due to the protracted lambing. These lambs. will be carried on and will sell when about 8 or 9 months old; however they are valued for the purposes of this experiment at 10s. per head.

THE Returns from the Matings.

Breed of Ram. Type of Ewe.	Lambs sold	Average Price,	Total Return from Lambs Sold.	Lambs on the Farm (at 10s.)	Total Retu- from Loops.	Value & ewes died at £1	Net Return Ewes for Lambs.	Average Return per Ewe Mated for Lambs.	*Ap- proxi- mate Wool Return.
Dorset Horn Merino Dorset Horn Comeback Dorset Horn Crossbred Ryeland Merino Ryeland Crossbred Ryeland Crossbred	38 31 15 53 43	s. d. 14 3 16 9 15 10 14 11± 15 3 16 1±	£ s. d. 27 2 0 26 0 1 11 1 1 29 18 10 40 9 2 34 13 7	£ s. d. 2 10 0 15 10 0 25 0 0 6 10 0 7 0 0 8 10 0	£ s. d. 44 12 0 41 10 1 36 17 11 36 8 10 47 9 2 43 3 7	£ 1 1 1 1 1	£ s. d. 40 12 0 40 10 1 35 17 11 32 8 10 46 9 2 42 3 7	s. d. 10 10 10 8 9 8 8 9 12 5 11 3	8. d. 10 6 10 6 10 6 10 6 10 6

<sup>\*</sup>The average wool return—given as approximately 10s. 6d.—could not be stated definitely as the comeback and Merino wool was sold together, and a large quantity of wool was transferred departmentally for educational purposes.

#### Conclusions.

This experiment indicates that the Merino ewe will mate readily at any time of the year, subject slightly perhaps to extreme seasonal conditions. As the Dorset Horn ram is a proved worker at all times, lambs of this cross could be produced at any time. It is realised that the resulting cross will not be of the standard of the second and other crosses, but should play an important part in effecting a continuity of supply, which will count so much in the stabilisation of the market.

#### The Bathurst Trials.

The Merino ewes used last year again formed the ewe flock for the lamb-raising experiment conducted at Bathurst Experiment Farm during 1929. The rams used were of the same breeds as last year's, namely, Dorset Horn, Ryeland, and Border Leicester.

The season was below average, with the result that the lambs, when marketed, were not up to the usual standard. Throughout the autumn and winter conditions were particularly dry, but the pastures improved considerably after the early October rains.

Mating commenced on 24th January, 1929, and concluded on 7th March. The following table gives details of the mating and lambing:—

Breed of Ram.	Ewes mated.	Rams used.	Ewes missed.	Ewes assisted	Ewes died.	Lambs born.	No. of twins born.	Lambs died.	Lambs marked.	Per cent- age marked.
Ryeland	57	2	2	15	3	55	3	10	45	78-9
Border-Leicester	57	2	13	4	2 ·	45	3	8	37	64.9
Dorset Horn	57	2	10	3	1	47	1	7	ن.	-0.1
		]								

MATING and Lambing Details.

The inadvisability of mating Ryeland rams with Merino ewes was again clearly demonstrated. It will be noted that fifteen ewes from fifty-seven mated needed assistance at lambing, and also that there were more deaths among the ewes mated to Ryeland rams than to either of the other breeds. Despite these losses the Ryeland gave the best return per ewe mated, this being due to the excellent percentage of lambs born. However, it can reasonably be assumed that the mortality would be infinitely higher with sheep run on a larger scale, as the attention this small flook received would then be impossible.

The lambs were sold in one consignment on 16th December. The average prices realised and the average returns per ewe mated for the lambs (exclusive of wool return) are given in the following table:—

AVERAGE	Prices	for	Lambs	and	Returns	per	Ewe :	Mated.
---------	--------	-----	-------	-----	---------	-----	-------	--------

Breed of Ram.	Ewes Mated.	Lambs Sold.	Average Price per Lamb.	Lambs retained on Farm (at 10s.).	Total Return from Lambs.	Ewes Died at Lamb- ing (at £1).	Net Value of Lambs.	Average Return per Ewe Mated.
Ryeland Border-Leicester Dorset Horn	57	38 35 37	s. d. 17 8 17 7 18 5	10 2 3	£ s. d. 38 11 4 31 15 5 35 11 5	3 2 1	£ s. d. 35 11 4 29 15 5 34 11 5	s. d. 12 6 10 5 12 2

#### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

#### Aug. 27. 26, 27, 28 26, 27, 28 Sept. 2, 3. 2, 3. 2, 3. 4, 5. 1980. Dungog (W. H. Green) ... Camden (G. V. Sidman) Goulburn (Major Harris) Apr. 2 to 4. Ungarie Ungarie Wagga (F. H. Croaker) Gunnedah Junes (G. W. Scrivener) West Wyalong Murrumburrah 3, 4, 5. 3, 4, 5. 9, 10, 11. 15 to 26. ... ... Goulbarn (Major Harris) Muswellbrook (R. C. Sawkins) Sydney Royal (G. C. Somerville) Orange (G. L. Williams) Wingham (C. H. Bienkin) Grafton (L. G. Lawson) Maclean (T. B. Notley)... Casino (E. Brallis) Transle (F. H. Hayles) Northes Sheep Show Narrandera Sheep Show (J. D. Newth) ••• May 6, 7, 8. Parkes (L. S. Seaborn) ... 4, 5. 9, 10. 10. Boorowa ... \*\*\* ••• 14, 15 20,21,22. Cowra 27 ... ---,, Barmedman June, 3, 4. July 9, 10. Bogan Gate (J. a'Beckett) ... 16, 17. 16, 17. 16, 17. Temora ... Canowindra \*\*\* \*\*\* , 15, 16. , 23, 24. , 30, 31. Aug. 5, 6. , 18 ... Newth) Cootamundra Sheep Show Young Sheep Show (T.A.Tester) Peak Hill (W. R. L. Crush) Tullamore (S. D. Cameron) Lake Cargelligo Trundle (W. P. Forrest) Newth) Forbes (E. A. Austen) ... Barellan ... Oct., î. 24. Ardiethan ... Quandilla Quandilla Hay (George C. McCracken) Narrandera (J. D. Newth) ,, 19, 20. ,, 19, 20. ,, 20. ... Bribbaree \*\*\* ... Illabo Grenfell \*\*\* Ariah Park \*\*\* ... ••• \*\*\* ,, Griffith Grenfell ... Cooney) ••• Cootamundra

### NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.

THE Co-operative Bud Selection Society, Ltd., supplied the following selected Valencia Late orange buds to nurserymen during the 1929 budding season, trees from which should be available for planting during this present year:—

T. Adamson, Ermington	•••	•••	•••	•••	Buds. 3,100
T. Eyles, Rydalmere	***			***	3,500
F. Ferguson and Son, Hurst	ville	***	***	***	1,500
R. Hughes, Ermington	***	***	***	•••	1.000
G. McKee, Ermington	***	***	***	***	3,000
L. P. Rosen and Son, Carlin	gford (	late of	Epping)		11,400
Swans Bros., Ermington	***				500

<sup>-</sup>C. G. SAVAGE, Director of Fruit Culture.

### The Green Peach Aphid (Myzus persicae).

PROGRESS REPORT ON SPRAYING EXPERIMENTS.

#### A. R. WOODHILL, B.Sc.Agr., Assistant Entomologist.

À SEVERE outbreak of green peach aphids occurred on the Murrumbidgee Irrigation Area in the summer of 1926, and statements were made by growers that they were unable to obtain control by the methods then advocated, i.e., a late winter spray with oil, followed by nicotine sprays in the spring. As a result the Entomologist of the Department of Agriculture arranged for a series of experiments to be carried out on the area over a number of years by the writer to determine the most effective method of control.

Experiments in 1927 yielded no results as the aphids did not appear that year, but further experiments in 1928 and 1929 gave very definite results and excellent control was obtained with certain sprays. While further work is necessary to confirm these results and to determine correct dilutions for some of the sprays, it was deemed advisable to publish this brief summary for the guidance of growers.

#### Life History of the Pest.

The life history is briefly as follows:—Egg-laying females deposit the over-wintering eggs in the peach trees during early winter and these eggs hatch out about the end of July and early August, and give rise to minute aphids. These aphids remain on the trees, but do not develop to any extent until the buds burst, when they commence to breed rapidly and produce enormous numbers of aphids, and it is at this stage that all the injury is caused to the trees. These spring generations of aphids are wingless, but in early summer winged forms are produced and the aphids migrate from the trees to various cultivated plants and weeds, known as secondary host plants, on which they live throughout the summer and autumn.

In early winter winged females are produced and these fly back to the peach trees, where they give rise to the egg-laying females. The winter eggs are minute, shiny black structures, and are deposited mainly around about the buds.

#### Control Methods.

It is not practicable to control the aphids on the secondary host plants, and although some measure of control might be obtained by destroying the autumn migrants and egg-laying females on the trees, this would necessitate very frequent sprayings, as the migration from the secondary host plants back to the trees continues over a period of some weeks. Control measures therefore can only satisfactorily be applied after all the winter

eggs have been deposited, and may be of two kinds, (a) ovicidal sprays applied when the trees are dormant with the object of killing the eggs before any of them hatch, or (b) aphicidal sprays applied before or after bud burst to kill the hatched aphids.

#### The 1928 Experiments.

At Leeton a block of trees showing a heavy uniform infestation of eggs was selected, and on 10th July a miscible red oil, a white oil, and limesulphur at winter strength were applied. At this stage all the eggs had been deposited, but none had hatched.

On 9th August, red oil (1 in 20), white oil (1 in 30), lime-sulphur (winter strength), and nicotine sulphate (1 in 600, plus soft soap 1 lb. to 25 gallons) were applied to other rows of trees. At this stage all the eggs had hatched and the buds were just commencing to burst.



Sprayed Trees.

Left: Tree sprayed once (in July) with tar distillate. Right: Tree sprayed once (in August) with nicotine sulphate.

On 12th September, nicotine sulphate and also a Japanese specific were applied to another series of trees. At this stage the leaves were well developed and were becoming curled up as a result of the aphid attack.

On 25th September, various nicotine, pyridine and pyrethrum dusts were applied. Of these sprays nicotine sulphate, applied on 9th August, 1928, gave excellent control, 100 per cent. of the trees remaining clean throughout the season. None of the other sprays or dusts gave a satisfactory

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To MANAGER, 132 George Street North, Circular Quay, Sydney control, and, with the exception of those trees sprayed with nicotine sulphate, on 12th September, 1929, the treated trees were just as heavily infested as the untreated control trees. The nicotine sulphate applied on 12th September, 1929, gave some degree of control, but could not be regarded as satisfactory.

Laboratory tests with eggs of the black cherry aphid, which are practically identical in structure with eggs of the green peach aphid, showed that neither lime-sulphur nor miscible oils were effective ovicides.



Unsprayed (Control)\_Tree.

#### The 1929 Experiments.

At Yenda a block of trees heavily and uniformly infested with eggs was selected and two series of sprays were applied, the first on 3rd July when all the eggs had been deposited, but none hatched, and the second on 20th August after all the eggs had hatched and within about a week of bud bursting.

As a result of the previous year's experiments the oil sprays and limesulphur were not used on the winter eggs, but two brands of tar distillate sprays were tested out. This type of spray had not previously been used in Australia for this purpose as far as the writer is aware, and was made available as a result of the Entomologist's inquiries in England during the previous year, when he arranged to have sufficient quantities forwarded for experimental purposes.

The aphicidal sprays applied on 20th August included red oil, white oil, two brands of nicotine sulphate plus soft soap, nicotine sulphate plus lime-sulphur, and phenol (1 in 150).

All the above sprays gave satisfactory control with the exception of phenol, which proved quite useless at the strength used. The most outstanding results were with the tar distillate sprays and nicotine sulphate, both of which gave excellent control, though on this occasion the oil sprays also, contrary to the previous season's results, gave satisfactory control.

Laboratory experiments with the eggs of the green peach aphid showed that the tar distillate sprays gave 100 per cent. kill, while the miscible oils gave practically no kill.

The tar distillate sprays were used in the field at the rate of 1 in 25 and 1 in 12½, and with both dilutions some damage to the trees resulted. This injury was responsible for the killing of a percentage of the buds, and was severe where a strength of 1 in 12½ was used, but only slight where 1 in 25 was applied. As a complete kill of eggs resulted with 1 in 25, it is considered likely that a strength of 1 in 30 or 35 will still give control without injuring the trees, and experiments to determine whether this is so will be carried out during the coming winter.

#### Summary.

It may be definitely stated, therefore, that in these experiments complete control of the green peach aphid has been obtained both by nicotine sulphate and tar distillate sprays applied at the correct time, one spraying only being necessary with either of these substances. In the case of nicotine sulphate the results have been similar for two successive years, while the tar distillate sprays have only been tested for one season. In each case it is essential to apply the spray at the correct time, which is as follows:—(a) Tar distillate sprays to be applied after all the eggs have been deposited and before hatching, i.e., from about the last week in June to the middle of July; (b) nicotine sulphate to be applied after all the eggs have hatched, but before the buds burst, i.e., any time during the two or three weeks prior to the buds bursting, usually from about 1st to 25th August.

The writer's thanks are due to Mr. K. McKeown, formerly of the Irrigation Commission, and to Mr. P. C. Hely, B.Sc.Agr., Assistant Entomologist, for very considerable assistance in these experiments in 1928 and 1929, respectively.

## The Relation of Scion and Rootstock in Fruit Trees.

H. BROADFOOT, Special Fruit Instructor.

THE use of root systems other than their own has been adopted for most fruit trees from the earliest times. The practice is continued at the present time for many varied reasons, and different kinds of stocks for each fruit are used in different countries, in different situations in the same country, and even with different varieties of fruit.

Much work has been done, is being carried out at the present time, and still remains to be conducted to determine the best stock for each fruit, or the chief commercial variety of each fruit, under such different conditions, but, first of all, a basic knowledge or understanding of the general principles of the relations of scion and rootstock is desirable.

#### Investigations with Vegetatively-propagated Stocks.

Very useful work in this connection has been done at various research and experiment stations in England and America. At the East Malling Research Station, England, the marked variability of trees in the orchard, not only when grown on seedling stocks but also on the recognised vegetatively-propagated stock in commercial use, has been investigated. As the result of this work, it has been shown that in the case of the latter, many different clonal strains existed, either through admixture or through insufficiently close attention being given to the source of the original stock. By pedigreeing the stock, selecting it in clonal lines, and testing these pure line stocks, it has been shown that the Paradise stocks in commercial use as a dwarfing stock for apples consisted of several groups with strikingly different influences on tree growth and performance. Free or seedling stocks are in commercial use in England for the production of standard trees, and at the Long Ashton Fruit Station, England, a number of such stocks are being increased in clonal lines with the object of finding a stock which is most suitable for the production of standard trees, and which can be propagated vegetatively for the uniform performance of such trees.

As the result of the work with apple stocks at East Malling, and because of the fact that seedling stocks show such great variability, which is reflected in the subsequent performance of the trees throughout commercial orchards, and because also of the outstandingly marked uniformity in the growth and subsequent performance of the trees on these pure line, vegetatively-propagated stocks, similar work was directed to other fruit tree stocks. This work at East Malling with apple stocks has already led to the commercial establishment of such pedigreed lines of vegetatively-propagated stocks of high uniformity whose performance is known and can be

guaranteed. The results have been so marked, and the work has been deemed so important, that it has been taken up by the Empire Marketing Board and a request made to those Dominions which are dependent to some extent on England as a market for their fruits that similar investigations should be undertaken in those countries.

Accordingly, the propagation of strains of apple and pear stocks which are either actually propagated vegetatively in a commercial way at the present time or which may lend themselves to vegetative propagation is being caried out by the Fruit Branch of the Department of Agriculture in New South Wales with the object of subsequently testing them for performance. Performance is, after all, the final determinant of the value of a stock to the orchardist. But the qualities desired by the nurseryman for their commercial propagation should also be considered.

#### The Influence of the Nurseryman.

The nurseryman rather than the grower has mostly determined what stocks shall be used for fruit trees in the past, largely because the fruit grower has not been able to give him a definite lead, from the standpoint of performance, as to what stocks were desired. In consequence, the grower has had to put up with stocks which are used by the nurseryman because they are reasonably good and because they are readily obtainable and easily propagated.

The work at East Malling Research Station has been of benefit to the apple-grower in England, at least in that the definite knowledge regarding performance has enabled him to give this definite lead to the nurseryman that a certain stock is desired, which fortunately is capable of easy propagation. Improvement, along the lines successfully followed with apples at East Malling, of those stocks which are already propagated vegetatively in a commercial way, would not seem to be difficult of accomplishment here.

The success of the work at East Malling with vegetatively-propagated stocks has prompted invasion of the field of those stocks which are propagated commercially as seedlings, and propaganda is being made generally in favour of the former against the latter. Even if, or when, proved to be of better performance, it may be difficult to turn the nursoryman from an easily propagated seedling stock to a difficulty propagated vegetative stock. Nevertheless, if the performance of the vegetatively-propagated stock is so superior to the seedling stock, investigations for the commercial improvement of the method of vegetative propagation are then desirable, and the East Malling Station considers that this improvement is easier than improving the performance of a poor stock.

#### The Case for Seedling Stocks.

But this side of the question cannot be so easily dismissed. There is the distinct possibility of improving the performance of what is called a poor stock. Seedling stocks in commercial use have the advantage, to the nurseryman, that they are readily obtainable and easily propagated. The main objection from the standpoint of performance is that they are extremely variable and irregular, and that this is reflected in the subsequent growth and production of the trees in the orchard. In many cases, the vigour and performance of the trees on seedling stocks is undeniable, and if their variability can be improved, as seems possible, they will still be a force to be reckoned with. Further, if this variability can be so materially improved, the "war might be carried into the enemy's camp" so far that seedling stocks may be brought about to displace the vegetatively-propagated stocks already in commercial use.

The underlying feature of the work on which the propaganda from East Malling is based, is the idea that the rootstock entirely or almost entirely influences the scion growth, and that the scion exerts little if any influence on the stock (i.e., on its root development which is its chief character of significance). Hatton' states that although a scion influence on the rootstock does exist, it appears to be quantitative rather than qualitative, and at any rate quite subsidiary to the much more potent influence of the root stock upon the scion.

In twenty years' experience, particularly with pome fruits, among the orchards of the State, the writer has come to the following conclusions with regard to fruit tree stocks:—

- (1) Generally speaking, trees on seedling stocks live longer, develop better, and bear more heavily and more consistently than trees on vegetatively-propagated stocks.
- (2) The extreme variability of trees on seedling stocks may be largely if not altogether controlled by low working (at ground level or below by root grafting) of the scion on the stock, or, in other words, the scion may be made to control the root development of the stock, which, in its turn, influences or determines the performance of the tree.
- (3) Root cuttings of seedlings may be quickly and easily propagated, while there is often great difficulty in propagation from root cuttings of known varieties.

Despite the fact that the vegetatively-propagated Northern Spy has been so largely used for many years as a stock for apples in Australia, because of its resistance to woolly aphis, the use of seedling stocks has been growing rapidly in recent years. The need for an aphis-resistant root stock for apples is not considered to be as urgent as many growers think, for seedling stocks have been found to have their roots thickly infested with this insect, and yet to give superior trees by comparison with those on adjacent, clean, Northern Spy stocks. Moreover, it is known that seedling stocks of certain cultivated varieties are just as resistant to or free from woolly aphis as the Northern Spy, if such a stock is desired. The Northern Spy stock is, further, not at all satisfactory under some conditions, especially where soil and climatic conditions are not very good for

apple-growing. The increasing use of seedling stocks, even of a mixed character and not immune to woolly aphis is based on their better performance in the orchard, and is quite acceptable to nurserymen, as such stocks are easily obtainable and easily propagated. To make seedling apple stocks completely satisfactory and vastly superior to the layered Northern Spy stock, therefore, the only thing necessary is to overcome their variability. As previously indicated, it is considered that this can be easily done by the method of working.

It may be asked, why have a stock at all? Why not grow the varieties on their own roots? The reason is that many of our commercial varieties do not lend themselves to successful and ready propagation from cuttings. A very near approach to, or even the final accomplishment of, growing the varieties on their own roots, however, can be made by root grafting. Northern Spy root grafts very readily—that is to say, the scion variety can be easily grafted on to a piece of Northern Spy root, which, when planted, roots quickly and promotes growth in the scion piece. If, however, the graft union is planted deeply in the soil, the rooting from the Northern Spy is largely inhibited, and rooting from the scion piece promoted. The scion variety growing on its own roots is thus obtained, and the Northern Spy nurse root may be cut away if desired.

Thus, either by root grafting or by low working on seedling stocks, highly uniform trees on their own roots or on controlled seedling stocks may be produced, whose performance can be guaranteed just as in the case of the pure lines of vegetatively-propagated stocks produced at East Malling.

Further possibilities still are opened up by the fact of the easy propagation of desirable seedling stocks by root cuttings. The comparative difficulty of the similar propagation of known varieties is explained by Upshall' as being probably due to their difference in origin—seedling roots having their origin in the seed or true root tissue, while scion roots spring from the stem, presumably from the cambium. This fact of the easy propagation of seedling root cuttings points to a further (possibly the best) commercial method of securing high uniformity, vigour, and pest or disease-resistance in a proved stock.

#### The Effect of Scion and Rootstock on Tree Growths.

At the East Malling Station, where the work has been concentrated on the vegetatively-propagated Paradise stocks, the whole trend has, naturally, been to ascribe the successful results to the importance and value of such clonal propagation. At the Long Ashton Station, however, where the investigations have been conducted chiefly with seedling stocks, no such great tendency was followed in regarding the stock as the all-important and only influence in determining the size and vigour of the tree. Barker has shown, from a comprehensive study of the reactions of types of known vigour used in various ways as stock and scion varieties,

that the scion variety, whether strong or weak, exercises a much greater influence in determining the size of the young tree than the rootstock variety. The conclusion is drawn that, so far as the tree of planting age is concerned, the rootstock used may result in a dwarfing effect, ranging up to 50 per cent. (as compared with the scion variety on its roots), but can give practically no increase in growth. A very vigorous stock, on the other hand, has little or no effect on the growth of a weak scion variety. Whichever is the weaker of the two, stock or scion, functions as the limiting factor in determining tree size. In other words, the size of a worked tree is approximately similar to that of a tree of the scion variety grown on its own roots, if the rootstock used is of a variety of equal or greater vigour; when the rootstock variety is less vigorous than the scion variety, the size of the tree falls short of that standard in proportion to the relative "weakness" of the rootstock variety.

Further investigations at Long Ashton have led to more important discoveries, which give an explanation as to the underlying cause of the relation between scion and stock. Swarbrick' found that there is a marked influence of scion variety upon the root character of the tree, up to at least three years from grafting. From studies of the root characters, it has been shown that trees of a variety which were budded very low on to the crown of the seedling root, were found to have a root character approaching that of root-grafted trees. On the other hand, trees that were budded very high on to the seedling stem piece, had a very variable root character. The conclusion was drawn that if the root proper and the scion variety are separated by a piece of stem other than that of the scion (either of the rootstock or of any other variety) then the root character may be but little influenced by the top scion variety. The suggestion is made that these observations explain in a large measure the results secured by using vegetatively-propagated rootstocks. Such stocks are stem pieces from which roots have arisen. The relative uniformity of top growth secured by the use of such rootstocks is due to the intermediate stem piece being of a uniform variety which produces correspondingly uniform root growths on the stocks, which in turn produce correspondingly uniform trees. In the case of seedling stocks which are worked at a height of 6 inches or more, the trees are diverse in character because they have a stem piece of variable nature, with correspondingly variable root growths, which finally produce such diverse trees.

Comprehensive observations on root growth are more difficult in England than they are in America, where seedling rootstocks are used almost entirely in commercial practice, and where the nursery trees are lifted and handled for bench grafting and again lifted and handled for storage after further nursery growth.

The chief work in America on the cause of the variable growth in apple grafts in the nursery has been done at the University Farm, Wisconsin. Roberts' states that one preventable cause of variable tree size in the nursery row in the position of the top bud of the scion in relation to the

point of callus union. A better stand and growth of grafts was found in those cases where the top bud of the scion (usually the one to force into growth) was directly in line with or above the point of callus union along the matched sides of the tongues. Small stocks were, however, less affected by bud position than large stocks. In addition, the observations were made that scion differences appear to produce more variation in the nursery rows than stock differences, and that the scion variety changes the root character of seedling stocks very greatly, but that of vegetatively-propagated stocks very little.

Corroboration of this influence of the scion on the stock, and a possible explanation of the phenomenon is given in the previously mentioned work at Long Ashton and also in further work at Wisconsin by Swarbrick<sup>6</sup>, who notes that there is not the variation in growth of orchard trees grafted upon seedling roots that occurs in plantings of seedlings. It is shown that the scion variety markedly affects the root character when grafts are made upon piece or crown roots. These observations have been also supported by anatomical examination of the roots—in transverse sections under the microscope.

Further observations by Roberts' indicate that scion source and preparation account for most of the variation in nursery tree growth. Using scions and roots of the same size greatly reduced the effects of bad position, as callus union takes place better all round the graft.

A further indication of the influence of the scion on the stock is given by Heinicke' who found that in young McIntosh trees top-worked with King scions, the McIntosh apples below the scions resembled the King in colour, flesh texture, and quality.

Although all these observations have been made so far only on nursery trees, it is reasonable to suppose that these influences are carried on during the life of the trees in the orchard. The East Malling investigations alone have been carried so far to this stage.

#### Summary.

Summed up, the position seems to be that when stocks are propagated vegetatively and budded high, pure or clonal lines of such stocks need to be developed, tested, and finally used to secure high uniformity, and for the best performance of orchard trees when seedling stocks are used, their variability needs to be overcome by working at ground level or below (root grafting).

It must not be considered sufficient, however, to have a pure clonal line of a vegetatively-propagated stock to secure uniformity. Even clonal stocks may differ in uniformity, largely according to the original size of the piece, and as pointed out by Anthony, if uniformity in growth is expected in the early years in the orchard, trees should be planted of uniform size whether on clone or seedling roots.

Many investigations on these and other lines, desired to isolate the best clonal strain of stock for vegetative propagation, as well as to determine the best species or kind of seedling stock for root grafting or low working, are under way in New South Wales, since it is apparently on these lines alone that greater uniformity and productivity can be assured in our orchards, so far as can be controlled by the choice of the nursery stock, and the method of working these on the scion variety.

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#### A CHANCE FOR ABERDEEN-ANGUS BREEDERS.

THE Department of Agriculture has decided to offer the recently imported Aberdeen-Angus bull, Black Edward Glencarnock 3rd, for sale at the forth-

coming Royal Agricultural Society's show sales.

This bull was presented to the Department by the Hon. J. D. McGregor, of Canada, when its dam, Blackcap Bixie 2nd, was purchased for the Department last year. Blackcap Bixie 2nd has calved another bull calf since her arrival in Australia, sired by Mr. McGregor's chief stud bull "Earl Eric Glencarnock 3rd," and consequently the Department deems it unnecessary to retain Black Edward Glencarnock 3rd for stud purposes at its Trangie farm, but thinks that the industry would be better served by disposing of the animal, which is of the Black Cap Revolution strain, to some breeder.

Any further particulars can be obtained from the Department.

THERE are no better opportunities of comparing your farming methods with those of your neighbours than by becoming a member of the Agricultural Bureau and attending its meetings and conferences. Write to the Department of Agriculture for full particulars.

### Wild Garlic or Crow Garlic (Allium vineale).

R. H. ANDERSON, B.Sc.Agr., Assistant Botanist. Botanic Gardens, Sydney.

This very serious weed pest has made its appearance in New South Wales, a specimen having been received from Berridale, on the Southern Tableland, where it was found growing in an old lucerne paddock. This appears to be the first recorded instance of its occurrence in this State, but it is a fairly common weed in Europe and America. In the latter country it is troublesome in fields of small grain, in pastures and in lawns, adding a garlic taint to wheat and dairy products.

It is a perennial plant resembling a small form of the garden onion, and has the strong pungent odour of the latter. Stems are formed of 1 to 3 feet in height, bearing at the top, where normally are flowers, a head of 30 to 100 aerial bulblets. These are pale purplish at the apex, passing into white at the base and are not unlike wheat grains in size and shape. The leaves are slender, cylindrical and borne up to about the middle of the stem, and rather a deep bluish-green colour. Beneath the ground clusters of two to six bulbs are produced, consisting of a large bulb with thin, soft, white skin, and one or several smaller ones with a hard, brownish skinand produced into a sharp point. The flowers vary in colour from pale green to reddish, but are seldom produced. The seeds are black and angular.

This weed is therefore able to spread in four ways—from soft-shelled bulbs, hard-shelled bulbs, aerial bulblets and seed. The aerial bulblets, being much the same shape and size as wheat grains, are difficult to separate from seed wheat.

As this weed is so troublesome in other parts of the world, farmers and pastoralists should be on the lookout for its appearance here. If doubtful about a plant, it should be forwarded to the Director of the Botanic Gardens, Sydney, for identification.

A recent leaflet issued by the United States Department of Agriculture deals with the eradication of this pest. Cultural methods, such as ploughing in autumn and again in early spring, and the subsequent growth of thoroughly cultivated row crops, are successful in combating the weed. Experiments with plant poisons showed that the only one which affected the ungerminated bulbs as well as the plants was coal-tar creosote oil (crude carbolic acid). It was found that about four thimblefuls of this material was fairly effective when applied directly to each clump of plants. Other experiments showed that small patches could be destroyed by one spraying each year for three successive years with waste crank-case oil, thinned with kerosene, and applied with a small hand pressure sprayer or sprinkling can. The garlic tops should be completely coated with oil, but the soil should not be saturated.

If, in some cases, eradication methods must be postponed or delayed, the formation of bulblets or seeds should be prevented as far as possible by cutting the plants before maturity. The scattering of the bulblets must be avoided.

### Orchard Notes.

#### APRIL.

#### C. G. SAVAGE and W. LE GAY BRERETON.

THE harvesting of late varieties of apples and pears, clean-up work in connection with codling moth, spraying for control of woolly aphis where the parasite *Aphelinus mali* is not established, preparation for the coming citrus harvest, and the planting, fumigation and re-soiling of citrus trees are some of the jobs which will be exercising the minds of orchardists during this present month.

#### Handle Fruit Carefully.

Late varieties of apples and pears are still being harvested, while the picking of early citrus varieties will commence next month, and although the importance of careful picking and subsequent handling of the fruit has been frequently stressed, there is still much evidence to show that growers have not yet realised how important it is that the skin of the fruit should be kept in a sound condition. Of course, after the fruit has been despatched they have little control over the way it is handled, but even here proper packing will help to minimise bruising during transit. If packed loose, the fruit is badly bumped about on its way to market, while, if packed too high, it is bruised when the lid is being nailed down.

Apples for the local market should be wrapped. This applies particularly to the best grades. The wrap should be finished over the stalk so as to prevent stalk injury. A slight bulge on top and bottom of the cases is desirable. This allows for shrinkage during transit. Naturally, to allow for this bulge, the case must have a flexible top and bottom. Where cases with rigid, hinged lids are used, the fruit should be packed with a very slight bulge, for obvious reasons.

#### The Coming Citrus Harvest.

The harvesting of citrus fruits will not commence till May, but growers should not wait till the last minute to get things ready for handling the crop. Picking boxes should be cleaned and repaired, if necessary, and arrangements made for obtaining any labour required.

Those growers not already in possession of a sizing machine are urged to buy or make one. The sizing machine does the work far more accurately, considerably quicker, and much more economically than if performed by hand. Any handy man can put one of these machines together, and the Department of Agriculture has particulars of construction available in pamphlet form. Write for a copy at once; there is no charge.

#### Re-soiling Citrus Trees.

Judiciously carried out, this operation has everything to recommend it. It ensures healthy and vigorous development of the tree, and encourages

productivity. Re-soiling can be practised alone or in conjunction with applications of farmyard manure or fertilisers.

#### Planting Citrus Trees.

Citrus trees may be planted during this month, but only in localities where autumn frosts are unknown. Take care to prevent the roots from drying out while being removed from the nursery to the orchard. It will be necessary to water newly-planted trees if they have been set out in dry soil. All poorly developed trees should be rejected without hesitation; retaining only the healthy, robust trees with good root systems. Before planting, be sure to remove all damaged roots, and then dip the remaining roots in a puddle just prior to planting out. The trees should be planted at the same depth as they grew in the nursery.

#### Control of Pests.

Codling Moth.—Measures for preventing the grubs from carrying over from the present until the next season should claim most of the apple and pear grower's attention at this time of the year. It is the carry-over grub which is responsible for each season's infestation. The destruction of all infested fruit at short intervals, a clean up of the packing shed, etc., are some of the means which suggest themselves to the orchardist who is intent upon controlling the codling moth.

Woolly Aphis.—Where the parasite Aphelinus mali is not established, and where the trees are badly infested with woolly aphis, give a good spraying with tobacco wash or nicotine extract as soon as the fruit has been picked. It is necessary to use plenty of force when spraying for this pest, and hold the nozzle as close as possible to the infested parts so as to dislodge as many as possible of the aphids. It is only wasting time and money to apply a "misty" spray for the control of woolly aphis.

Citrus Red Scale.—Fumigation for red scale may be continued during this present month, but unless the work is completed very shortly the fruit will not be free of the scale by the time of marketing, for although the scale will be killed it will adhere to the fruit for some time afterwards. Failures and poor results are the outcome of carelessness and guesswork, for which there is no excuse, as the Department will forward, on application, a pamphlet giving the fullest particulars on the fumigation of citrus trees.

#### LEARN TO RECOGNISE THE VARIOUS NOXIOUS WEEDS.

For some months past the Department of Agriculture, with the co-operation of the country newspapers, has been carrying on a campaign of instruction in regard to the identification and eradication of noxious weeds Watch your local paper each week for the illustrated articles on weeds. The illustrations will enable you to recognise without trouble the worst of the noxious weeds. The best means of control are also given.

### Poultry Notes.

#### APRIL.

#### E. HADLINGTON, Poultry Expert.

POULTRY-FARMERS who hatch chickens from their own stock should now be making preparations for the coming breeding season. Very often this work is put off from day to day with the idea that there is still plenty of time to select the breeders, but in a short time all the birds should be settled down in their pens in order to commence hatching operations early. Early hatching is a necessity where pullets and cockerels are used as breeders so that they will be at least ten months' old when required. In any case early-hatched birds are more profitable than those hatched late in the season, and 1st June is not too early to commence setting eggs.

Another reason why an early selection of breeders is advisable is that it affords an opportunity of seeing whether any of the hens or pullets are laying undersized or badly-shaped eggs, and of eliminating them if possible before the start of the season, thus obviating disturbance of the birds after the eggs are being saved for incubation.

There is no necessity to put the male birds in the pens right away—this can be done a week or so before it is desired to commence saving the eggs for the incubators—but the hens or pullets should be settled down so that there will be a better chance of their laying when the eggs are wanted than if they are only placed in the pens a week or two before the season starts.

It is a good plan to put down a trial hatch from the various pens a week or two earlier than the main hatching commences to ascertain whether the fertility of the eggs is satisfactory, making allowance, of course, for the fact that a high percentage could not be expected very early in the season. In case of a total failure from some pens, the male bird might be changed and given a trial later in the season.

#### Foundation Stock.

Those who are contemplating hatching their own chickens for the first time should be sure that the stock which they are going to use is of good pysique and sound breeding. On no account should birds reared from dayold chicks be used as foundation stock unless it is known that they are from specially selected stock. Day-old chickens as a general rule should only be looked upon to provide a flock of layers.

It is unwise to attempt to save a few pounds by buying inferior stock for breeders, yet on the other hand there is no necessity to pay fancy prices for stock. For a sound foundation the birds should be possessed of robust constitution, together with the characteristics for egg production, which have previously been described in these notes.

#### Feeding the Breeding Stock.

As soon as the breeders are settled in the pens consideration should be given to the feeding. If more than 5 per cent. of concentrates, such as meat meal, &c., of approximately 55 to 60 per cent. protein content, has been used previously in the ration, this should be reduced to not more than the amount above stated, as too much concentrates will lead to poor hatching results. It should be remembered that the results of improper feeding may be felt for some weeks after a change has been made. This is a factor which is often overlooked when trouble has been experienced with regard to hatching.

Extra care should be taken with the feeding of breeders to see that they receive as much as they require, without any excess. A little extra maize in the evening feed is beneficial, making that grain at least one-third of the cereal feed. As a matter of fact, if maize were cheaper half or more could be used with advantage.

A liberal supply of succulent green feed given at midday will also benefit the breeding stock.

The male birds should receive special attention, as it frequently happens that they stand aside calling to the hems at feeding time and do not get their share of the feed, and where this occurs they soon become poor in condition, very often before anything is noticed. Sometimes when a bird loses condition he will be seen to rush frantically at the feed, and to those who do not visualise what is wrong it may seem that he is a good feeder, and no further notice is taken. The fact is that only a bird which has been starved will behave in such a manner, and when that stage is reached there is only one thing to do, that is to take out the bird and feed him up. If this occurs late in the season, which is frequently the case, it will be the end of the season before he will recover his condition. To guard against such happenings, the best plan is to make a practice of giving the male birds a feed of whole maize by themselves at midday. This can be done by shutting the hens in the house and leaving the males in the yard.

#### Growing Green Feed.

During this month is about the best time to sow lucerne seed, provided the ground has previously been thoroughly prepared and is free from weeds and grass. Lucerne is undoubtedly the most satisfactory crop to grow for green feed, because, apart from its value as a green food, it can be cut for the greater part of the year—where water is available to install an overhead sprinkling system, there is practically no month of the year when at least some cutting cannot be done. In most soils in the County of Cumberland lucerne is best sown in drills about 18 inches apart. This allows of cultivation between the rows and mulching with fowl manure, frequent applications of which can be made after the crop has become established.

Another crop which can be planted to provide green feed for the winter months is Berseem clover. This will thrive better throughout the colder months than lucerne, and will keep up a supply when the lucerne is more or less dormant. It can be planted in drills the same as lucerne, and requires much the same treatment, but only lasts one season. Other crops which can be sown during this month are barley, kale, and rape. Barley, of course, may be sown broadcast, and, given good conditions, can be cut several times during the season. Thousand-headed kale is a very useful class of green feed, and should be grown more extensively, as it lasts for two or three seasons and is a good stand-by when other crops are not available. Kale should be sown in drills about 3 feet apart, and the plants require thinning out to at least 2 feet apart in the rows, as they grow to a height of 2 to 3 feet in good soil. The plants which are thinned out can either be transplanted or fed to the birds in the same way as rape, but those left for the permanent crop should be allowed to become well established before breaking off the leaves for use. The plants grow up with a main stem, and the leaves—somewhat like cauliflower leaves—grow out at the sides, and it is these which are used for feeding to the birds. With reasonable rainfall, or when irrigated, the plants quickly shoot out fresh

While it is somewhat late to sow a crop of rape, it may be worth while putting down a small area if other crops are not available. Rape can be sown broadcast, using 1 lb. seed to an area of about 60 feet by 50 feet. This will provide a fairly thick crop, which can be thinned out as soon as the plants are large enough to pull up for the birds.

Although green feed is beneficial to fowls, having a tonic effect and supplying mineral elements, it should not be used to excess in place of more concentrated food. In times of high costs of foodstuffs, however, the feed account can be reduced where an abundant supply of green feed is available by using chaffed-up greenstuff in the morning mash instead of bran, provided that not more than about 25 per cent. of the whole mash is made up of greenstuff. Additional green feed can also be given at midday if there is sufficient on hand.

All green feed must be of a succulent nature; on no account should stalky or badly-wilted crops be used, as they only lead to digestive troubles and do more harm than good.

#### Rice Feeding Experiments.

A five-months' test of feeding paddy rice to poultry has just been concluded at the Government Poultry Farm, Seven Hills. It was not possible to continue the experiment longer on account of the pens being required for other purposes; the results, therefore, cannot be regarded as conclusive, but the indications are that no harmful effect follows the use of rice, even to the extent of 50 per cent. of the evening feed, and that the feeding of all rice for the evening feed has no apparent effect on the health of the birds, though it will be seen from the table of results that egg-production suffered to some extent compared with the check pens, the falling off in production becoming more pronounced as the test proceeded. The difference between the laying of the check pens and those fed on all rice for the exeming feed.

was approximately ten eggs per bird for the whole period, while the pens fed on 50 per cent. rice averaged two and a quarter eggs per bird less than the checks.

In laying down the experiment, ninety white leghorn pullets were selected and divided up into nine groups of ten each, the birds in each group being as even as possible as regards age, condition, and general conformation. Three groups of ten birds each were fed on all rice for the evening feed. another three groups of the same number were given 50 per cent. rice and 50 per cent. of wheat and maize combined in the proportion of two of wheat to one of maize for the evening feed, and the other three lots (check pens) were fed on the evening feed used at the Farm at that time, i.e., 75 per cent. wheat and 25 per cent. maize. The morning feed was the same for all the pens in the experiment.

The numbers of eggs laid by the different groups of birds in the experiment (which was conducted from 4th October, 1929, to 28th February, 1930) were as follows:-

Evening Ration.	Oct.	Nov.	Dec.	Jan.	Feb.	Total.	Total for three pens.	
All rice	$\begin{cases} 191 \\ 189 \\ 195 \end{cases}$	190 154 164	149 169 118	109 108 98	86 102 71	725 722 646	2,093	
Rice 50 per cent., wheat 33\{\} per cent., maize 16\{\}\{\} per cent.	$\begin{cases} 183 \\ 178 \\ 188 \end{cases}$	158 170 184	178 186 164	143 142 124	117 104 103	779 780 763	2,322	
Check, wheat 75 per cent., maize 25 per cent.	$\begin{cases} 182 \\ 192 \\ 192 \end{cases}$	173 188 205	151 167 160	172 132 155	120 102 99	798 781 811	2,390	

Eccs Laid in Rice Poultry Feeding Experiment.

To be able to draw any definite conclusions as to the value of rice as a poultry food it would be necessary to carry out further experiments, but it appears a fairly safe substitute at times of high food costs. The trouble, however, at the present time is that all supplies have been used, and it will be next month before any more will be available. Even then only a limited quantity is likely to be sold as stock food, although it is possible that larger supplies may be obtainable towards the end of the year.

### Bonus on Flying Fox Scalps to be Discontinued.

As only 13s. 4d. was paid out in bonuses on flying fox scaps during last year, the Department of Agriculture has come to the conclusion that the 2d. per scalp it has been paying for some years past has had little or no effect in controlling the pest.

It has therefore been decided to discontinue the payment of the bonus as from 30th June next.

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1st May, 1930.

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# "They bite holes in transport costs!"



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Agricultural Gazette of New South Wales.

### Protection of Young Citrus Trees From Frost.

E. S. WEST, M.Sc., Officer in Charge, Commonwealth Research Station, Murrumbidgee Irrigation Areas.

COMMERCIAL citrus growing is limited to more or less sub-tropical regions which, as a general rule, are subject to frosts during the winter. Should these frosts be severe, damage will be done either to the fruit or tree. Comparatively severe frosts will destroy the fruit, and very severe frosts will defoliate the mature tree, and may even kill the main branches. If the chances for the occurrence of many frosts of such intensity are very great, the locality should be considered unsuited to citrus culture.

The only known practicable method of preventing such damage is by orchard-heating, but this method is so expensive as to render it doubtful whether the expenditure is profitable.

Young citrus trees are very much more susceptible to frost damage than old trees, and frosts that do no damage to either the fruit or foliage of old trees may completely kill young trees. In almost all citrus-growing districts, during some seasons, at least, frosts serious enough to damage young trees occur, so that a method of treatment (other than orchard heating, which is too expensive) that will prevent or lessen the risk of frost damage to young trees, would be of great value.

Many methods of protecting plants from frost are in common use, and those that depend on covering the plant with an insulating or a screening material are suitable for young citrus trees. Covering part or the whole of the tree with straw, hessian, or some such material, should afford some protection from frosts, though the questions arise as to the most efficacious method of covering the tree, the degree of protection afforded, and whether any ill effects other than from frost result from the treatment. It has been observed that where hessian is wrapped around the stem of the tree, and becomes wet with rain or dew, it may freeze on frosty nights, and actually increase the risk of frost.

Loose soil is such a poor conductor of heat that anything covered with a few inches of soil will certainly be protected from frost in any locality in which citrus trees can be grown. Hume\* recommends mounding up soil around the stem, while Coity does not favour the method on account of the danger from gum diseases.

Sufficient evidence has not been adduced to show that smudge fires—used to cover the orchard with a dense smoke screen, and not to be confused with fires used for orchard heating—are of any use at all for frost protection.\*

<sup>\*</sup> Hume, H. H. (1926), "The Cultivation of Citrus Fruits," page 337. † Coit (1922), "Citrus Fruit," pages 245–246.

During the winter of 1929, an experiment was carried out to test various methods of frost protection for young citrus trees, young Washington Navels planted on the square system in thirteen rows of nine trees each being used for the purpose. The trees had all been planted out in the spring of 1928. Most were two years old from the bud at the time of planting, a few were three years old from the bud, and a few one year old from the bud (i.e.; were budded in the autumn of 1927). Owing to the great individual variation in the susceptibility to frost of the trees treated in any one particular way, the results were in some respects indefinite.

The following treatments were selected for trial:-

- (1) No protection.
- (2) Stem protected with hessian; a wire-netting tube, about 3 inches in diameter was placed round the stem, and the hessian was wrapped around this tube.
- (3) Several layers of newspaper wrapped around the stem and tied with string.
- (4) Clean, loose soil mounded up round the stem, forming a cone about 1 foot to 18 inches high.
- (5) Hessian sacks (chaff bags) placed over the trees, the open ends being lightly buried in the soil.
- (6) As in (5), but the hessian first dipped in tar and then in sand. This was done to see what effect such complete shading would have on the tree, as in many methods of frost protection most of the sunlight is excluded.
- (7) Trees completely wrapped in a thick covering of straw, so that no green leaf or stem was visible.

With the 117 trees available, seventeen trees were used for all but two of the treatments, and for these two sixteen trees only were available, the different treatments being distributed throughout the block. The field was flat and the soil uniform, and there was no reason to expect more severe frost in one part of the field than another.

Three very severe frosts were experienced on the mornings of 12th, 13th and 14th June, 1929. The minimum temperatures near this field on the days were as follows:—

The state of the s		12th Junc.	13th June.	14th June
On lawn (terrestrial) On bare soil 2 cms. above ground 1 metre above ground 2 metres above ground	 	deg. Fah 22·0 25·1 27·1	deg. Fah. 13·8 20·7 23·0 24·0	aeg. Fah 14-8 22-1 24-7 26-1

These frosts, coming in the early winter, were responsible for much damage to young citrus, and are the frosts that caused the damage here reported.

The protections were removed from the trees on 26th September, 1929, when danger from further frosts was negligible, and the trees were examined for frost damage. A further inspection was made on 4th December to confirm the first observations; the reason for this was that in cases of frost damage a tree may look healthy in the spring, but owing to frost injury to the bark on the stem, may succumb soon after active growth commences; on the other hand some trees look almost completely killed, but buds will burst and the tree recover.

The trees were grouped into four classes according to their condition after the winter, as follows:—

- (1) Dead.
- (2) Dead above the union of the scion and the stock, but stock still alive.
- (3) Main stem alive, but branches dead.
- (4) Unaffected. This group included those trees that had healthy stems, and green and healthy branches. In some cases the trees may have been defoliated, or a few of the smaller shoots may have been killed, but a large proportion of the main branches were alive and green.

The trees of the first two groups had to be replanted, while in the case of groups (3) and (4) it was not necessary to replant.

Table I shows the number of trees protected in the various ways that were placed in each class. The number of trees of each age has been shown, and as was to be expected, an inspection of the totals in the bottom row indicates a high positive association between trees one year old when planted, and fatal frost injury, and this must be borne in mind in further considering the data.

TARLE I.—EFFECT of Protective Measures against Frost.

								_					
photography consider the miner installable special in the set of	Trees Dead.			Trees Dead to Bud Union,			Trees with Stem Alive.			Trees Unaffected.			
Protection.	1 year old.	2 years	, 3 years old.	I year old.	2 years old.	3 years old.	1 year old.	2 years old.	3 years old,	1 year old.	2 years old,	3 years old.	Total.
No protection Hessian over wire	3	3	3		2	•••		1			, <b>5</b>	•••	17
round stem Paper round stem	3 1	1		•••	2 1				•••	2	8 12	1	17 16
Mound of soil round	 1	 8	1	1 2	1 5		2	8		•••	4 1		17 17
Hessian over tree  red hessian over  (4)	2	7	2		3	1		2					17
distinctive	5	3	•••	•••	•••	***	***	2	1		4	1	16
otal	15	23	6	3	14	1	. 2	13	1	2	34	3	117

TABLE II.—EFFECT of Protective Measures on Trees Two Years Old from Planting.

*		Proportion	of Total.
Treatment.		Trees Dead to Union	Trees with Stem Alive.
No treatment Hessian over wire round stem Paper round stem Mound of soil round stem Hessian over tree Tarred hessian over tree Straw over tree	 	.5 .3 .1 .1 .9 .8	.5 .7 .9 .9 .1 .2 .7

In Table II the results for the trees two years old at the time of planting are given, as restricting the data to trees of a uniform age gives a more trustworthy comparison. In this table the first two and second two groups have been added together, giving two generalised classes, and for each treatment the proportion of trees falling into these two classes is given correct to the first decimal place.

Compared with the untreated trees, it appears that every treatment, except covering the tree with hessian, either tar-dressed or otherwise, has afforded some degree of protection, but that these two treatments have been definitely injurious. The most efficient treatments appear to be wrapping the stem with paper, and mounding up the stem with soil. The hessian wrapped round a cylindrical wire frame probably acts as a screen to the stem of the tree, intercepting the radiant heat, while the paper wrapping and soil act as insulating materials, retarding the conduction of heat from the tree to the colder exposed surface.

The effects of the mounding with soil were interesting. Table I shows that ten out of a total of seventeen trees had their branches destroyed, but the main stems protected by the soil survived. It was noticed that, almost without exception, where soil was mounded up around the stem, the bark was destroyed just where the stem emerged from the soil, but a few inches below the soil the stem was quite healthy. It appeared that the injury at this part was more severe, and more general than in the other treatments where no soil was mounded up. It would therefore appear that mounding up with soil is a very sure protection against frost for that part of the tree covered with a few inches of soil, but greatly increases the liability to frost of the part emerging from the soil. It is well known that the most susceptible part of the citrus tree to frost is the union of the scion and stock. has always been explained by the assumption that the union is a nat weak part of the tree. May it not be that frost injury is greatest at the re re because under ordinary conditions it is near the surface of the ground

It is evident that placing a hessian sack over the tree is in some way injurious as trees treated in this way suffered more damage from the frost than unprotected trees. The hessian bent the foliage over, and probably gave very little protection to much of the foliage, as the twigs were pressed against the hessian which was coated with frost crystals on frosty nights. It is possible that a hessian screen supported on framework over the trees in such a way that the hessian did not come into contact with the foliage might give better results, but such an arrangement, even if found to be satisfactory, would probably be too expensive. Although not apparent from Table II, the tarred hessian was even more injurious than the untreated hessian, as it was noticed that the foliage died much sooner under the tarred hessian. This may have been due either to the more complete shading or to a direct chemical injury. Trees completely enveloped in straw appeared to gain some measure of protection, but as only nine two-year old trees were used in this treatment, no great reliance can be placed on the results.

It is possible that in the case of most protective coverings, the final effect is, broadly, the result of two opposing factors. Checking the falling in temperature of the tissues of the tree is a beneficial factor, while interference with photosynthesis, aeration, and other processes is a detrimental factor, inasmuch as a certain weakening of the tree results, and it would appear from the observation that a tree in any way weakened, such as by partial wilting, presence of excess salt in the soil, poor nutrition, or mechanical injury, is more susceptible to frost injury; so that the amount of benefit or otherwise that any protection affords is dependent on the relative intensities of these two factors.

It has been noticed also that tissue which seems quite healthy when coverings are removed, dies later after exposure. This point, however, requires further investigation. In this connection Hume\* advises against completely burying the tree in soil on account of the resultant injury.

It cannot be said that these results are as yet very conclusive. It is evident that where only small differences exist, a very much larger number of trees should be used than were here available.

#### Summary.

From the trial it appeared that-

- (1) Wrapping a few thicknesses of paper round the stem of the trees gave very effective protection from frost.
- (2) Mounding soil up round the stem was effective protection to the stem, but increased the injury to the branches.
- (3) Protecting the stem with a cylindrical wire-netting frame 3 inches in diameter covered with hessian, was less effective.
- (4) Placing a hessian bag, either tarred or not tarred, over the tree was distinctly detrimental.

<sup>\*</sup> Hume, H. H., "The Cultivation of Citrus Fruits."

# Pasture Improvement on the Near Southern Highlands.

R. N. MAKIN, Senior Agricultural Instructor.

EXPERIMENTS in pasture improvement have awakened the minds of many of the farmers and graziers on the near southern highlands to the advantages to be derived from such a practice at a comparative small outlay for seed and fertiliser.

From Wingello to Tahmoor, areas laid down to pasture grasses, more particularly Subterranean clover, are to be seen, having been well established during the past favourable season. Within the same area many satisfied themselves as to the value of superphosphate as a fertiliser for top-dressing natural and introduced pasture plants, with a view to increasing the bulk and palatability of the stand.



Fig. 1.—Subterranean Clever.
On left: At Boys' Farm Homes, Mittagong. On right: On Mr. J. E. Creelman's farm at Wingello.

There is absolutely no doubt about the value of Subterranean clover as a pasture plant, or its ability to adapt itself to almost any soil condition, providing there is sufficient rain to bring it along. Moreover, it appears to grow well in some of the higher and drier country where White clover does not thicken. There is one feature that cannot be lost sight of in establishing this plant, and that is the immense benefit derived from an

application of superphosphate when the plants have germinated. No matter what class of soil, superphosphate (about 1 cwt. per acre) makes sufficient difference to leave no regrets concerning the small expense incurred in top-dressing.

At the Boys' Farm Homes, Mittagong, 50 acres were laid down to Subterranean clover in 1928 (see Fig. 1), and practically supported a beast to the acre during the spring and early summer months of the past two seasons, very little hand-feeding being done during that period. The photograph was taken on 14th November, 1929. The same block (Fig. 1) shows a stand at Wingello, and was taken on 5th December, 1929. The growth in this case is on light sandstone country, and has impressed property owners in the district; it is in its second year.



Fig. 2.—Pasture Improvement work on Mr. J. N. Garland's Property at Bundanoon.

Left: Perennial Rye and other grasses growing on steep hillside. Right: Phalaris bulbosa and Subterranean clover.

At Bundanoon, Mr. J. N. Garland has established some excellent pastures, and at the time of my visit (5th December, 1929), the paddocks were a waving mass of luxuriant pasture plants. One of the most interesting was that established on a very steep red basalt hillside, where Perennial Rye grass, Cocksfoot, clover and lucerne ran riot, and lucerne stems measured up to 3 feet 11 inches in length. The photograph (Fig. 2) gives only a rough idea of this pasture. In an adjacent paddock, which was not so steep, a wealth of *Phalaris bulbosa* and Subterranean clover was noticed (see Fig. 2). Mr. Garland hoped to save some of these paddocks for seed. The use of superphosphate was no doubt instrumental in producing such an excellent growth. It is intended to turn every acre to account in this manner.

On Mr. E. R. McDonald's property at Penrose, on light sandstone country, pasture plants are being established in, perhaps, an unorthodox manner. The country in its natural state carries mostly shrubby growth, which, in parts, is dense. Here, where possible, seed of Perennial Rye grass, Tall Oat grass. Subterranean clover and lucerne was broadcasted and the scrub growth felled on it. This method has proved a great success, the photograph (Fig. 3) showing the growth that has come through the rubbish. This has been



Fig. 3.--Illustrating the Success of Mr. E R. McDonald's Method of Establishing Pasture Plants.

allowed to seed down in order to establish a thick stand, when stock will be turned in and, in seeking the grass, will break up all the finer growth of the scrub which has not yet rotted, and later the heavier stuff can be stacked and burnt. This method should prove effective in winning a vast area of country between and along the ranges and the coast.

#### THE FEEDING VALUE OF WHEY.

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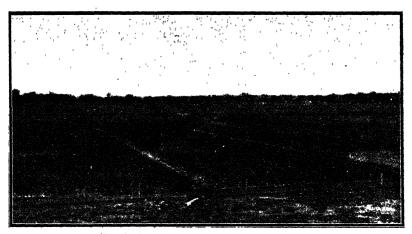
The Government Printer, Phillip Street, Sydney

## Onion Trials, 1929.

#### (1) Farmers' Experiment Plots.

J. DOUGLASS, H.D.A., H.D.D., Agricultural Instructor.

FURTHER trials with onions were carried out throughout the main onion-growing districts of New South Wales during the past season. The year, from an onion-growing point of view, was a bad one. Heavy losses were experienced throughout the whole State from onion mildew. On the coast, where the climatic conditions are favourable to the development of this disease, practically every crop was attacked. It was noticed that the greatest amount of damage occurred in closely-planted or thickly-growing crops, and those on old onion ground. Any losses that occurred in the western districts were mainly due to planting onions on the same land as the previous crop.



Mr. T. W. Sunderland's Crop of Onions at Dubbo.

On the coast it is the practice to sow the seed direct in the field. The stand obtained depends largely, though not wholly, on the vitality of the seed. Conditions for the planting of the past crop were ideal, and in most cases excellent germinations were obtained. As the conditions were ideal, the seed should have been planted lighter. Farmers should have their seed tested for vitality by the Department, but as this had not been done growers were not disposed to risk lighter sowings, the result being that thick stands were obtained. Normally, thick stands produce a large percentage of "picklers" and also encourage onion mildew. It has been found that seed grown on the coast varies considerably in vitality, and a test would allow growers to vary the rate of sowing according to the vitality.

Western growers who practise transplanting the seedlings should note that it is just as essential to rotate the position of the seed beds as the site of the next crop.

#### Experiments on Mr. Sunderland's Farm at Dubbo.

Owing to the heavy reduction in yields caused by "mildow," the whole of the coastal and Wellington experiments were discarded. Messrs. S.



A Heavy Crop.

Onions from two irrigated beds thrown together.

Gordon and W. T. Sunderland, both of Dubbo, co-operated with the Department in conducting trials at that centre.

Mr. W. T. Sunderland's farm is situated on the banks of the Macquarie River below Dubbo. The soil varies a good deal, but is mainly medium loam. The rainfall is so erratic that heavy irrigation has to be practised. Mr. Sunderland has grown onions on a commercial scale for a number of years with marked success. During the past season 2 acres were grown, and as the whole of this crop had to be transplanted, some idea can be obtained of the work involved. The methods employed create a good deal of work, but ensure definite results, as illustrated by returns obtained from the commercial areas last year.

Three trials were conducted on this farm: (1) Early White variety trial, (2) main variety and strain trial, and (3) manurial trial.

#### Early White Variety Trial.

The object of this trial was to ascertain the most suitable variety to plant during February for the early white crop, which is harvested during October. To realise top prices the onion must be a white one, of any shape, hence only white strains were included in the test.

The chief difficulty met with in regard to this particular crop is that seed of reasonable purity is difficult to obtain. The white varieties sold by most seed houses, if not mixed in variety, are totally unselected and of little value. The Chinese white variety was at one time a good one, but at present, as a result of Chinese methods, contains 30 per cent. brown

bulbs. In the case of the Early Victorian White, the chief disadvantage lies in its late maturing under western conditions. Early White Huntor River, which is illustrated in the white group, is now well known for its consistent heavy yielding quality and outstanding appearance. The variety is a selection by Mr. S. Redgrove, of Branxton, and has given good results under all conditions. In the western onion districts this selection has proved an excellent keeper.

#### YIELDS of Early White Varieties.

			tons.	cwt.	qrs.
Early Hunter River White	 		 18	11	<b>^ 2</b>
A Chinese White Variety	 	• • •	 18	7	3
Early Victorian White	 		 10	11	2



Hunter River White.

Early Victorian White.

#### Main Variety or Strain Trial.

This trial, which was perhaps one of the most successful that has been carried out in New South Wales, was conducted with the object of ascertaining the most suitable strain or variety of onion to grow under western conditions. The method of growing is to sow the seed in beds, transplant to the field, and heavily irrigate. Varieties suitable for this work will not necessarily give good results under other methods.

As in previous years the different strains of Hunter River Brown Spanish produced the best results. A strain selected by Mr. C. J. Rowcliffe, of Dubbo, gave the heaviest yield (21 tons 3 cwt.), and has proved itself to be most suitable for this method of culture. The greater proportion of Mr. Sunderland's commercial area was devoted to this strain.

Improved Hunter River Brown Spanish, a selection by Mr. Redgrove, produced the second heaviest yield of 18 tons 6 cwt. 1 qr. In past seasons this strain has produced better results. In the case of Mr. McKimm's strain it has proved to be the earliest strain under test, and hence not such a heavy yielder. This strain is of excellent shape and quality, with practically no neck when mature. It is very suitable for coastal work.

Lord Howe Island is a very old variety that was introduced into these trials. It has proved to be suitable for irrigation farming, but is of doubtful commercial value until it becomes better known. The bulb is of a deep purple colour, flat in shape, with a small neck. This variety is classed as an early maturer.

YIELDS	in	the	Variety	Trials.
--------	----	-----	---------	---------

Variety or Strain.	W. Sunderland.	S. Gordon.
Hunter River Brown Spanish (J. C. Rowcliffe) Hunter River Brown Spanish (S. Redgrove) Hunter River Brown Spanish (McKimm's, Dubbo Raised) Early White Hunter River (S. Redgrove) Lord Howe Island (R. Stocks) Hunter River Brown Spanish (McKimm's, Maitland Raised) Early Victorian White Early Barletta		t. c. q. 8 4 0 8 4 0 7 0 0 8 2 0  12 10 0

A trial in which coastal-raised seed from Mr. McKimm's strain was tested against seed raised at Dubbo from similar bulbs yielded very much in favour of the Dubbo-raised seed.



Early Barletta.

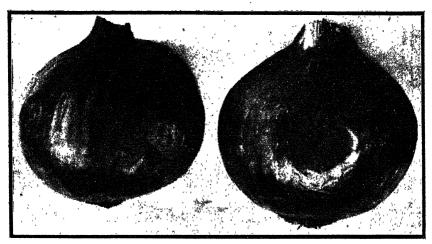
#### The Fertiliser Experiment.

A fertiliser experiment was conducted with the object of ascertaining the most profitable fertiliser to use on the onion crop under western conditions. The variety used in this trial was a local Chinese white of mixed origin. The fertiliser was broadcasted on the irrigation beds previous to transplanting.

Last season basic superphosphate and M22 produced equal yields; this year basic superphosphate topped the list with a yield of 19 tons 14 cwt. 2 qrs., M22 fertiliser mixture only filling third place. The season was a

cold one even up till December, and consequently soil conditions were not suitable for obtaining the best results from bonedust. It is thought, however, that over a number of years M22 will produce results superior to other fertilisers.

Basic superphosphate produced an increase in yield of 5 tons 1 qr. over the average of the "no manure" plots. When valued at £12 per ton (actual net selling price), this increase represents an increase in returns of over £60 per acre. The fertiliser cost under £2 per ton.



Hunter River Brown Spanish.

Rowcliffe Strain.

Redgrove Strain.

#### RESULTS of the Fertiliser Trial.

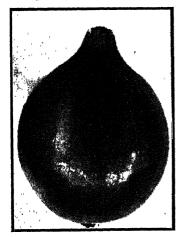
				tons.	cwt.	qrs.
Basic Superphosphate	•••	•••	525 lb. per acre	 19	14	~ 2
Superphosphate			840 ,, ,	 18	2	1
M22 mixture	,		420 ,, ,,	 17	1	1
Pl1 mixture			490 ,, ,,	 16	18	0
Superphosphate			420 ,, ,,	 14	14	1
No manure	•••	• • •	***	 14	14	1
Pl3 mixture		***	560 lb. per acre	 14	7	0

Note.—M22 fertiliser mixture consists of equal parts of superphosphate and bonedust; P11, six parts superphosphate and one part sulphate of ammonia; P13, six parts superphosphate, one part sulphate of ammonia, and one part sulphate of potash.

#### Experiment on Mr. Gordon's Farm at Dubbo.

This grower specialises in the production of early white onions, the variety grown being Early Barletta. The seed is usually planted in March, large quantities of fertiliser being used and heavy floodings given every two weeks in the spring. Early Barletta responds to this treatment even on rich soils, as illustrated by the returns of over 12 tons per acre from commercial areas on this farm.

The varieties under trial were planted on 4th April, and the seedlings transplanted on 9th August. The plots were fertilised with 5 cwt. super-



McKimm Strain of Hunter River Brown Spanish.

phosphate per acre. Very heavy frosts during the winter months greatly checked the growth of seedlings. During the spring heavy irrigations were carried out twice monthly. Harvesting took place on 18th December.

Rowcliffe's and Redgrove's strains of Hunter River Brown, Spanish produced 8 tons 4 cwt. per acre. The late planting of these varieties greatly reduced the yields.

Early Barletta, which produced the heaviest yield, was planted some weeks earlier than the other varieties, and is therefore not comparable.

It is a well-known flat white variety of early maturity and has given

very erratic results over a number of years. This irregularity has largely been due to use of unselected seed. In the past many plants of this strain absolutely failed to bulb or show signs of maturing. However, work has been done in this direction, and it is hoped greatly to improve the variety. Early Barletta does not run to seed when planted early.

#### (2) Cowra Experiment Farm.

#### R. N. MEDLEY, H.D.A., Experimentalist.

During normal seasons, and when the crop can be irrigated, onions are one of the most profitable vegetable crops grown at this farm. The past season, however, was one of the driest experienced in the Cowra district, and was very unfavourable to the growth of onions. The rainfall during the growing period was as follows, although the 366 points recorded in November were of no benefit to the crop:—May 28 points, June 125 points, July 21 points, August 211 points, September 107 points, October 77 points, November 366 points; total 935 points.

#### YIELDS in the Variety Trial.

Early Improved Hunter River Hunter River Brown Spanish (J. C. Roweliffe) Early Hunter River White	tons. 3 3	ewt. 13 7 2	qrs. 2 3 2	lb. 18 12
Hunter River Brown Spanish (A. McKimm)	2	18	3	20
Dutch Silverskin	2	4	2	16
Odourless	Faile	đ.		

During the past three seasons, Early Improved Hunter River, Early White Hunter River, and Hunter River Brown Spanish (J. C. Rowcliffe) have proved the most consistent yielders at this farm.

Early Hunter River White is easily the most suitable white-skinned variety yet tried here, being of good shape, of mild flavour, and a very satisfactory keeper.

Silverskin did not impress, the shape and size leaving much to be desired.

As was the case in 1928, Odourless failed to germinate, which was disappointing, as it gave great promise in the 1927 trials.

#### (3) Bathurst Experiment Farm.

#### J. A. WILLIAMSON, H.D.A., Experimentalist.

During last season onion variety, fertiliser and time of sowing trials were carried out at Bathurst Experiment Farm, and although the experiments will have to be repeated over a number of years before definite recommendations can be made, some points of interest have already been brought out.

#### The Variety Trials.

The variety trials were planted on both upland light granite loam that had been improved by applications of farmyard manure in past seasons, and also on heavy alluvial loam, and the results indicate, especially in the case of the upland trial, that it is easy to grow onions on a large scale even where the soil is not very fertile.

The seed of all varieties was sown in the seed beds on 26th March, the germination being satisfactory in all cases. The plants were dibbled out in the case of the upland trial on 20th June, and for the alluvial trial on 5th July. Just prior to transplanting the plots were fertilised with equal parts of superphosphate and bonedust at the rate of 3 cwt. per acre.

Dry conditions, persistent hard frosts, and boisterous drying winds somewhat retarded the winter and early spring growth, and while the upland trial was irrigated when necessary the alluvial trial suffered considerablly through lack of water for irrigating. Conditions improved later and although the October and November rains greatly benefited the upland trial they were too late for the alluvial plots. The rainfall was as follows:—May, 72 points; June, 119 points; July, 34 points; August, 186 points; September, 110 points; October, 138 points; November, 293 points; December, 22 points; total, 974 points.

#### YIELDS in Variety Trial on Upland Soil.

Variety.						
White Bermuda		8 7 7 6 6	cwt. 84 121 8 121 8 114 74 9 64 23 104			

#### YIELDS in Variety Trial on Alluvial Soil.

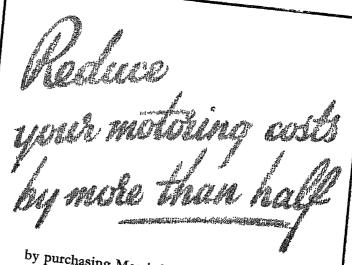
Hunter River Brown Spanish (McKimm) Hunter River Brown Spanish (J. Rowcliffe) Crystal White Wax White Bermuda Early White Hunter River Early Victorian White Lord Howe Island Chinese White Hunter River Brown Spanish (S. Redgrove) Early Barletta	 tons. 5 5 5 4 4 3 3	ewt. 18½ 11 9½ 7½ 13¾ 6¾ 11½ 10 3½ 18

The earliest onion grown in these trials was Early Barletta which is a very white, flat, mild onion. It is a poor keeper and not a heavy yielder unless sown earlier than March, and is generally recommended as a profitable variety to strike the early Sydney market.

Two promising early onions included in the trial for the first time this season were: (a) Crystal White Wax, a white, very flat, medium-sized onion, which closely resembles Early Barletta; and (b) White Bermuda which is really a light straw coloured, flat, medium-sized onion. White Bermuda and Crystal White Wax are not quite as early as Early Barletta, but on their first trial at this centre they easily outyielded the Barlettas, and, like Early Barletta, neither has a reputation as a keeper.

Two mid-season maturing onions, Chinese White and Early Victorian White, were not as promising as the Crystal White Wax or White Bermuda, as neither variety was as early nor as satisfactory a yielder this season. The Chinese White proved to be a very mixed sample and contained several brown coloured onions.

Early White Hunter River ripens too late to be compared with Early Barletta, but appears worthy of consideration as a mid-season white onion and one which has proved an excellent keeper in earlier tests at this centre.



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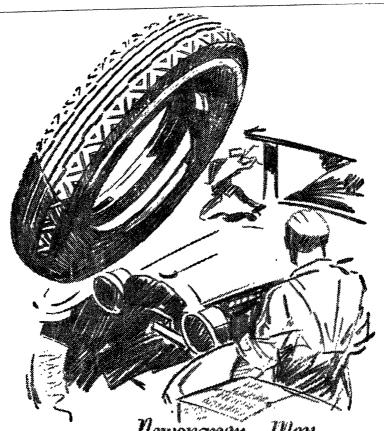
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Lord Howe Island is a dark purplish red globe-shaped onion of medium size with a tough thin skin. It has yielded fairly satisfactorily and has proved a good keeper; it is more of a mid-season than early onion.

The latest or main crop onion grown in these trials is Hunter River Brown Spanish, and the most promising strains of this variety during the past season were McKimm's strain, from Maitland, and J. C. Roweliffe's strain. S. Redgrove's strain of Hunter River Brown Spanish and another strain of McKimm's from Dubbo, while fairly satisfactory, were not equal to the previous strains as regards yields this season, but in previous seasons Redgrove's strain has grown the highest yields of all strains of Hunter River Brown Spanish.

#### First Record of Onion Smudge.

Onion smudge (Colletotuchum circinanas), the only disease present, was noticed at harvesting time. This is the first time the disease has been officially recorded in the State, and the high percentage of moisture in the soil combined with humid conditions during the late growing period are said to have favoured the disease. Affected bulbs are marred in appearances, and are liable to undue shrinkage in storage. Red and yellow varieties are said to show considerable resistance to the disease, in which respect it is worthy to note that Bermuda, a straw-coloured onion, did not show any sign of the disease, although grown between Early Barletta and Crystal White Wax, which were both affected.

#### The Fertiliser Trial.

The fertiliser experiment was arranged on a heavy alluvial loam. Early Barletta was the variety used, the seed of which was sown in seed beds on 26th March, and the plants dibbled out in the field on 3rd and 4th July. Harvesting took place on 26th and 27th November, the results being as follows:—

YIELDS in the Fertiliser Trial.

Fertiliser.		cre ield.		rease acre.		lue o			ost o		Ne	t Ga	in.
Superphosphate, 3 cwt. per acre Superphosphate (1 part) and Bonedust (1 part), 3 cwt. per acre. Superphosphate (1 part) and Bonedust (2 parts), 3 cwt. per acre. Superphosphate (10 parts) and sulphate of ammonia (3 parts), 435 lb. per acre.	3 2	13½	t. 1 1 0 0	ct. 4½ 5 11½ 3½	12 5	s. 5 10 12 15	d. 0 0 6	0 1 1	17 2	d. 6 3 10	£ 111 11 4 0	s. 7 7 8	d. 6 9 8
No fertiliser	2	10		•••		•••			•••			***	

<sup>\*</sup> The onions were valued at £10 per ton.

These results indicate that phosphatic fertilisers are of great assistance in improving the yields of the onion crop, even on the rich alluvial loams of the district. Insufficient data are yet available on which to make definite

recommendations, but it would appear that while superphosphate is of great assistance in a dry year, a mixture of bonedust and superphosphate would probably be more beneficial in a normal season. The inclusion of sulphate of ammonia does not seem necessary.

#### Time of Sowing Experiment.

The object of this experiment is to determine the most suitable month to sow early onions, such as Early Barletta, and also main crop onions, such as Hunter River Brown Spanish, for the best yields of good quality early onions under local conditions. The experiment consists of a series of six monthly sowings of Early Barletta and Hunter River Brown Spanish, the sowings being made regularly on one of the first five days in each month, January to June. Each plot was sown in duplicate, one being fertilised with a mixture of equal parts of superphosphate and bonedust, applied at the rate of 3 cwt. per acre, the other being left unmanured.

RESULTS of the Time of Sowing Trial.

			Early B	arle	tta.			H	ınter River	Brov	wn Spa	nish.
Month Sown.	Fei	rtilised.	Seed heads.		nferti- lsed.	Seed heads.	Fei	rtilised.	Seed heads.		ferti- sed.	Seed heads.
January February	7	123	percentage No se	t. ed 6	availa 5	percentage ble for Ja	nua   6	ry sov 7‡	41	4	94	percentage
March April May	1 1	73 101 161		1 0 1	19 <del>1</del> 19 <del>1</del> 3 <del>1</del>		4 2 1	01 14 191	5 	2 2 1	18¾ 5 15¾	14
June	Ō	17		Ō	144		Õ	184		Õ	16	

The Early Barletta and Hunter River Brown Spanish varieties were both transplanted on the same date after each sowing, but the ripening and consequently the harvesting dates differed somewhat. The following table indicates the dates of sowing, transplanting and harvesting in each case:—

		Dates Harvested.			
Date Sown.	Transplanted.	Dates nsplanted.  Early Barletta.			
2 February	. 23 April 27 May 30 July 21 September	23 December	28 November. 2 December. 10 December. 2 January. 10 January.		

It is unfortunate that a January sowing was not made this past season, but in the previous trial the January sowing, although giving the highest yield, produced poor quality Early Barlettas with thick necks and a tendency to split, and it was the only sowing of Early Barlettas which showed a tendency to run to seed that season.

It is too early as yet to make any definite statement regarding the most suitable time to sow onions, but it would appear that a February sowing will be found satisfactory in the case of early onions such as Early Barletta, and a March sowing may be found preferable for the main crop Hunter River Brown Spanish onions.

It is intended to continue this experiment for three more seasons to enable a more definite statement to be made.

#### TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.		Number tested.	Expiry date of this Certification.
J. Miller, Casula		15	1 April 1980
Navua Ltd., Grose Wold, via Richmond (Jerseys)		اشما	
New England Girls' Grammar School, Armidale			
	•••	40	4- "
Department of Education, Gosford Farm Homes	•••	1 1	24 May, 1930
William Thompson, Masonic School, Baulkham Hills		0 7 1	
		00	
F. Charley, Glen Innes (Ayrshires) P. Ubrihien, Corridgeree, Bega E. P. Perry, Nundorah, Parkville (Guernseys) Sacred Heart Convent, Bowral A. Shaw, Barrington (Milking Shorthorns) St. Patrick's College, Goulbury			29 , 1986
P. Ubrihien, Corridgeree, Begg	•••	(	8 June, 1986
E. P. Perry, Nundorsh, Parkville (Quernseys)		0.0	
Sacred Heart Convent. Rowrel	•••		14 ,, 1986 17 July 1986
A. Shaw, Barrington (Milking Shorthorns)	•••	104	2 Aug., 198
St. Patrick's College, Goulburn	•••		
Walter Burke, Bellefaire Stud Farm, Appin (Jerseys)	•••	-0	
Mittagong Farm Homes, Mittagong	•••		00 100
H. W. Burton Bradley, Sherwood Form Moorland (Tomowa)	•••		80 ,, 1986
		1 -	4 Sept., 198
Walaroi College, Orange	•••		
Riverstone Meat Co., Riverstone Meat Works, Riverstone	•••	. 8	19 , 198
J. L. W. Barton, Wallerawang	•••		27 ,, 198
Diaggad (Namalia Caminana Milata and	***		9 Oct., 198
H A Corderov Warne Park Combound	•••	1 - 1	25 , 193
H. A. Corderoy, Wyuna Park, Comboyne	•••		1 Nov., 198
	•••		3 ,, 193
	•••		8 ,, 193
	•••		11 ,, 193
	***		22 ,, 198
Lunacy Department, Canan Park Mental Hospital	***		29 ., 198
Bathurst Experiment Farm (Jerseys) Lunacy Department, Morisset Mental Hospital	***		1 Dec., 193
Cunacy Department, Morisset Mental Hospital	•••	. 21	7 Jan., 198
Parbery, C. J., Allawah, Bega	***	. 88	7 ,, 198
	•••		10 ,, 193
	•••	. 72	11 ,, 198
Lansoy Department, Parramatta Mental Hospital			23 ,, 198
Mise Brennan, Arrankamp, Rowral	•••		19 Feb., 198
Department of Education, Yanco Agricultural High School	•••		21 , 198
G. A. Parrish, Jerseyland, Berry			27 ,, 198
Lunacy Department, Kenmore Mental Hospital	•••		28 ,, 193
Hawkesbury Agricultural College (Jerseys)		. 160	1 Mar., 198
St. Joseph's Girls' Orphanage, Kenmore			3 193
St. Michael's Novitiate, Goulburn		. 5	3 198
Kyong School, Moss Vale		. 3	4 . 198
St. Joseph's Convent, Reynold-street, Goulburn		. 4	4 198 5 198
St. John's Boys Orphanage, Goulburn	*** *	. 7	5 ,, 198
Marion Hill Convent of Mercy, Goulburn			6 . 198
Cowra Experiment Farm	***	1 00	6 . 198
Tudor House School, Moss Vale	***		21 198
H. F. White, Baid Blair, Guyra	***	000	3 April, 198
Grafton Experiment Farm (Ayrshires) Department of Education, Huristone Agricultural High Sch		100	5 , 198
Department of Education, Huristone Agricultural Figh Sch.		41	10 , 193

### WINTER SCHOOL FOR FARMERS, POULTRY FARMERS, ETC., 1930.

Arrangements are now being made for the usual Winter Schools to be held at the Hawkesbury Agricultural College, Richmond, from the 1st to 18th July, 1930, the duration of the various courses of instruction and the fees charged being as follows:—

_	T.	ce.	
	£	s.	d.
1st to 18th July-Mixed Farming (Wheat and Sheep)	3	10	0
1st to 18th July—Poultry Farming			
8th to 18th July—Dairy Farming (Cattle and Pigs)	2	5	0
8th to 18th July—Horticulture (Orcharding, Vegetable Gard-			
ening, Bee-keeping)	2	5	0

The fees charged for each Course include hoard and lodging, tuition, and medical attention.

The Courses of Instruction will be open to both sexes over 16 years of age. Intending students will enter into residence on the first-named date in each case. No examinations are required for the Course, and persons of mature years, as well as young men and women, are welcomed.

Students travelling from country centres will be able to obtain a reduc-

tion in rail or steamer fares to and from Richmond.

A comprehensive syllabus is now being prepared, and will be available at an early date. In the meantime, intending applicants should communicate with the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

#### REDUCED PRODUCTION COSTS MEAN MORE PROFIT.

THE urgent need in Australia is to lower the cost of production of the commodities of which we produce a surplus—wool, wheat, butter, and fruit. With falling values for these staple commodities it is essential, if we are to meet the demands of foreign competition, to increase the productivity of each individual worker and cut production costs to the minimum.

The farmer generally pays more attention to the price of his products than to the cost of producing them. But the prices of those commodities sold on a world market—wheat, wool, butter—are largely beyond the control of the farmer. On the other hand the costs of production, within limitations, are subject to the farmer's control. Various items entering into production costs are virtually fixed. These include taxes, land capital costs, upkeep and certain general expenses. But the major costs of production, excepting only land capital costs, are not fixed. They vary with the intelligence and skill of the farmer, and the power and equipment he applies to them. It is in the preparation of the land, seeding, tillage, cultivation, harvesting and hauling of the crops that the major expenses are incurred, and to the degree to which these can be reduced, the profits of the farmer can be increased. The farmer will be compelled to accept world prices for his products so long as he must sell a surplus above domestic needs in the world markets. World consumers will buy from him only to the extent that he can sell as cheaply or more cheaply than other sellers.—A. E. V. RICHARDSON, in the Journal of Agriculture, South Australia.

## Lucerne Growing Competition.

PARKES P. A. AND H. ASSOCIATION.

H. BARTLETT, H.D.A., Senior Agricultural Instructor.

THE second annual lucerne-growing competition promoted by the Parkes Pastoral, Agricultural and Horticultural Association was judged by the writer on 6th and 7th January last. There were thirteen entries. The object of these competitions is to attract attention to the possibilities of lucerne as a grazing crop on wheat land and to encourage the sowing of large areas, while a later development will be to determine the best methods of cultivating and stocking the stand.

The season was the most severe for the past thirty years, and although the conditions were generally unfavourable for establishing satisfactory lucerne stands, results achieved in this direction were beyond all expectations. The rainfall as registered at Parkes was:—June, 1928, 174 points; July, 275 points; August, 90; September, 36; October, 152; November, 79; December, 2; January, 1929, 10 points; February, 136; March, 236; April, 117; May, 64; June, 103; July, 32; August, 216; September, 119; October, 69; November, 141; December, 307.

AWADDO	in	tha	Parkog	Lucerne-growing	Competition
AWARDS	111	tne	rarkes	Tucelie-alowing	Compeniion.

Position.	Competitor.	Density and even- ness of Stand.	Height and even- ness.	Leafi- ness.	Col- our.	Free- dom from Dis- eases.	Clean- liness.	Total.
	Maximum Points	40	15	15	10	10	10	100
1 2 3 4 4 7 7 9 10 11 *	J. Townsend, No. 2 John Barber, No. 1 W. W. Watson R. Job R. A. & O. Hockey, No. 1 H. S. Cousins, No. 1 R. R. & O. Hockey, No. 2 H. S. Cousins, No. 2 A. Milgate H. S. Cousins, No. 3 J. Townsend, No. 1 John Barber, No. 2	35 34 33 34 31 33 31 28 31 27 35	13 11 10 10 11 12 9 10 11 10 8 13 11	12 11 11 10 10 10 10 10 11 9 8 13 10	9888888797	9 10 9 10 10 10 10 8 9 10 9	9 9 10 8 6 7 6 7 9 7 5 8	89 84 82 79 79 76 76 76 75 74 65 87

<sup>\*</sup> Only one entry from an exhibitor was eligible for a prize.

#### Cultural Details of Winning Entries.

Mr. J. Townsend, Willow Vale, Parkes.—This competitor's No. 2 entry secured first place. The seed was sown in soil of the deep, dark to black loam type, adjacent to the Billabong Creek. An old paddock; it was

fallowed and sown to lucerne in April, 1927, 13 lb. of seed, and 60 lb. superphosphate per acre being used. The germination was rather poor, but evenly distributed over the area. Since sowing, six cuts of hay have been obtained, and it has been grazed frequently, as required. In August, 1928, the area was cultivated and top-dressed with 120 lb. of superphosphate per acre. In July, 1929, it was harrowed twice with weighted harrows.

Mr. Townsend's other entry secured next highest points in the competition, but the rules specify that only one entry from each exhibitor is eligible for a prize.

Mr. John Barber, Daisy Park, Goobang.—Mr. Barber's No. 1 entry was awarded second place in the competition. This stand was sown on deep, dark to black loam soil adjacent to the creek. Wheat was grown in the paddock in 1926, and in August, 1928, 10 lb. lucerne seed and 60 lb. superphosphate to the acre were sown in a well-prepared fallow. The seed was dropped on the surface and rolled. The total area in the paddock is 48 acres. A cutting in December, 1928, yielded up to 40 tons of mixed hay, which, however, contained a fair proportion of weeds and grasses. Since December, 1928, in conjunction with a paddock of 60 acres of grass country, the area has wholly maintained 400 sheep. The late Christmas rains induced a very dense germination of stinking love grass, which, however, was effectively destroyed on 2nd January by means of weighted harrows.

Mr. W. Watson, Woodbine, Tichborne.—Mr. Watson secured third place with a crop sown at the end of May, 1928, on a soil of silty loam 10 inches deep, with a fairly retentive subsoil. The paddock had produced a wheat crop in 1927, and the stubble was scarified in January, and again in April. Seeding was at the rate of 4 lb. per acre and superphosphate 70 lb. per acre, the seed being covered to a depth of 1½ inches, after which it was lightly harrowed. This area has been frequently grazed, mostly with sheep, and on it 650 fat lambs were put in good condition during September and October, 1929. The area has not been cultivated or top-dressed to date. Commencing with 10 acres of lucerne several years ago, Mr. Watson has gradually increased his area until to-day he has 130 acres under lucerne.

#### General Comments.

Soils.—As experience is gained, it becomes very evident that practically all soils in the wheat areas will produce satisfactory lucerne crops for grazing purposes, but it is also most marked that lucerne is very selective in its preferences. Naturally the best growth takes place on the deep black loam soils adjacent to creeks; also the value of an occasional flooding is immense. Lucerne's value on upland soils of almost any type is many times greater than that of the natural pastures. It is rather early yet to state if the fairly deep loam soils with free subsoils are preferable to the more typical wheat country, that is, those with the subsoils 6 or 10 inches below the surface, as good results are being obtained on both types.

Seed-bed.—The ideal is an exceptionally well-prepared fallow, but results of the past year have shown that where the seed-bed is at all faulty, that is, too loose, better results have been secured from shallow worked stubble land. This stresses the importance of a fine, compacted seed-bed.

Although its importance has been stressed, and a fallow should be aimed at, yet we find that most of the areas submitted, particularly those sown in 1929, were sown on stubble land. When we consider the adverse conditions as regards rainfall, such a result gives every encouragement to sow larger areas, and is a wonderful tribute to the hardy characteristics of the lucerne seed and plant. While not advising farmers to sow on stubble, the absence of good fallow should not deter the sowing of lucerne during 1930 if the conditions prove favourable.

Time to Sow.—Many considerations suggest April as the best time to sow, and yet we find excellent results from May, June, July and August sowings. Two farmers in the district sowed substantial areas during the last week in December, 1929, following on the useful rains of Christmas time. The result as yet has not been observed. During April, if moisture is present, and while the warmth is still in the soil, there are certainly many advantages.

Rate of Seeding.—For upland wheat soils, 4 lb. of seed per acre is ample. On richer classes of country, such as the deep black loams near creeks, 6 lb. should be sufficient. One entry submitted by Mr. Townsend, and the entries of Mr. Barber, were remarkable for uniformity of germination, but they lost points, due to the fact that the stands were too dense. From 9½ to 12 lb. of seed has been sown, but although this country is rich, it is thought that the stools will not grow sufficiently large and robust to withstand fairly long spells of dry weather.

Treatment of Stand.—Opportunity was afforded of observing the effect of frequent grazing with sheep compared with that of large stock during the early periods of establishment of the stand. Messrs. R. R. and O. Hockey's areas showed bigger stools and stronger growth where the large stock had been used, and Mr. Milgate's area also showed the advantage of keeping the sheep away from the paddocks since last October. Several growers advocated feeding off the first year's growth with large stock. The development of the stools on Mr. Barber's No. 1 entry was rather backward, due no doubt partly to the dense stand and constant grazing of sheep.

Care in Grazing.—From time to time reports are received of mortality among sheep. It is well known that all stock are tempted to gorge when first placed in lucerne areas, resulting in "hoven." The precautions to take are well known, but even with careful men things sometimes go amiss. The second or young luscious growth is particularly dangerous, and opinion is fairly general that the safest time to graze is when the plants commence flowering. As this trouble is of such moment, farmers are asked to observe all local and relevant conditions at the time of the trouble, and make the results known to those who are interested.

From the success of the past two years, farmers are now confident as regards the value of lucerne, and greatly increased areas will be sown within the next year or two. When recommendations were made to sow 50 to 100 acres it was hardly anticipated that areas of up to 500 acres would so soon be sown. Past experience demonstrates how hardy the plant is and that useful results may be secured under what might be termed cheap practical conditions, where the total sowing costs do not exceed 17s. 6d. per acre.

# VERY YOUNG PLANTS OF NOOGOORA BURR PROVED POISONOUS.

Owing to the fact that another plant of the same genus as Noogoora Burr had been found to be poisonous in America and in view of there being some difference of opinion in Australia as to the effect of young Noogoora Burr plants on stock, some experimental work was recently undertaken at the Glenfield Veterinary Research Station, and as a result it has been found that Noogoora Burr plants are poisonous to stock, but only at an extremely early stage of growth.

The plant as it comes through the ground shows two primary leaves or cotyledons. Their appearance is followed by the development of a stalk and the usual leaf growth. The only stage found to be poisonous has been the cotyledonary stage and that stage when the plant shows only two leaves and still has the cotyledons attached. The cotyledons soon wither away, and plants tested after they have disappeared have not been found to be harmful. Pigs are most susceptible, calves coming next. Sheep may also be poisoned but are not so susceptible as either calves or pigs.

The above experiments were carried out as part of the investigations into poisonous and suspected plants, conducted under the Poison Plants Committee of the Council for Scientific and Industrial Research.—MAX HENRY, Chief Veterinary Surgeon.

#### POINTS IN USING WHITEWASH.

Whitewash has a wide application to farm use, and deserves a much greator popularity than it at present enjoys. Its ingredients are inexpensive and readily obtained, it is not difficult to make, and it is easy to apply. In addition to these advantages it protects the surfaces to which it is applied, brightens up dark interiors, and is sanitary. Whitewash may be coloured, provided that light tints and shades are used and that the pigments are not affected by lime. Among such are yellow other, raw and burnt umber, and raw and burnt sienna. The surface to be whitewashed should be just as clean as one that is to be painted, and it is a first essential to good results that all dirt, dust, grease and scaly material be removed before there is any attempt to apply the wash. This implies a liberal use of scrapers and stiff brushes. When the cleaning is finished and the surface dusted, it is well to dampen it slightly just before applying the wash.

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## Wheat. Oats, and Barley Trials, 1929.

FARMERS' EXPERIMENT PLOTS.

#### Riverina District.

G. C. BARTLETT, H.D A., Agricultural Instructor.

The following farmers co-operated with the Department of Agriculture in conducting experiments with wheat and oats last season:-

C. W. Moll, "Eldersleigh," Gerogery. G. Nation, "Greenbank," Jindera.

G. Nation, "Greenbank," Jindera.
W. Goldsworthy, Walbundrie.
E. Zeibarth, "Fairview," Brocklesby.
G. Perry, Wagga-road, Holbrook.
C. Woodhouse, Glenroy, Tumbarumba.
McMillan Bros., "Bonnieville," Henty.
C. Campbell, "Avondale," Munyabla.
T. McAuliffe, Glenroy, Tumbarumba.
T. Rodham, Uranquinty.
W. Lawrence, "Bedhapk," Coolamon

T. Rodnam, Grandunty.

W. Lawrence, "Redbank," Coolamon.

E. H. G. Eldershaw, "Kywong," Marrar.

E. Hamblin, "Ravenstone," Ganmain.

J. Charles, "Stoneleigh," Grong Grong.

R. Hodgson, South Cullival, Urana.

P. McLennan, "Forest Lodge," Morundah.

P. McLennan, "Forest Lodge," Morundah.
A. Kerr, "Sandy Mount," Oaklands.
J. Gollasch, "Pine Park," Milbrulong.
F. Knight, "Bolinda Glen," Jerilderie-road, Corowa.
W. Thornton, "Spring Farm," Berrigan.
W. Waite, "Fleurs," Finley.
F. A. McPherson, Finley-road, Jerilderie.
W. Glenn, "Maneroo," Mathoura, via Moama.
W. J. Symes, "Chah Singh," Moulamein.
H. W. Öberin, "Condoulpe," Balranald.

These comprised variety trials with wheat and oats, manurial trials with wheat and oats, and seeding trials with wheat. In addition a trial of a rotation of wheat-peas-wheat is being conducted at Henty, but this is not yet completed. So far the results have been very disappointing, the peas being badly frosted and the land becoming infested with weeds. This rotation is being tested out in comparison with rotations of wheatfallow-wheat and secondly with wheat-oats-fallow-wheat.

#### Seasonal Conditions.

These were the most severe experienced for some years. Following two abnormally dry years, there was no reserve in the subsoil and the crops and farming methods were severely tested. There was a good break in the first week of April which enabled needy working of the fallows to be carried out and seeding to be proceeded with straight away. However, there was no further rain of a beneficial nature over the bulk of the district until the end of September. Except in a small portion of Eastern Riverina, this was too late to be of much benefit. The winter was not

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Tinders.	Ps 376 82 82 113 1196 299		:		<u> </u>
Albury.	Pts. 271 82 110 351 17	57 128 144	1,176	229 133 191 118 239 342 76 136	1,464
Bairanald.	Pts. 51 23 148 1148	14 80 81	532	181 25 17 115 93 38 94	563
Moulamein.	Pts. 66 10 13 158 158	13 184 47	516	222 85 61 116 116 211 91	902
Deniliquia.	Pts. 103 38 58 151 5	14 60 173	909	334 49 57 25 122 77 247 79	066
Mathoura.	Pts. 91 21 102 102	117 30	400	242 41 47 23 112 70 70 74	837
Jerilderie.	Pts. 119. 75 138 8	100 100 96	612	227 60 50 82 147 118 113 56	811
Finley.	Pts. 106 64 54 197 26	10 78 59	000	255 65 60 22 104 82 42 42	781
Betrigan.	Pts. 95 50 148 33	14 96 94	9	293 56 82 82 82 152 101 30	842
Соголя.	Pts. 200 41 99 274	76 236 200	1,130	250 28 83 83 24 150 160 27	771
Milbrulong.	Pts. 161 26 78 289 280 20	35 163 93	865	175 58 106 19 61 77 77	746
Oaklands.	Pts. 102 44 58 152 	31 171 126	101	289 67 80 32 189 313 101 93	1,154
Morundah.	Pts. 126 18 82 82 451 20 52	78 98 79	1,004	218 50 64 23 282 78 78	919
.ansıU	Pts. 92 86 61 172 172 15	23 193 103	712	241 59 48 28 161 221 63	882
Narrandera.	Pts. 162 40 76 245 44	13 71 241	915	225 44 63 39 190 169 122	917
Coolamon.	Pts. 183 67 79 215 18	10 158 194	938	79 54 54 174 174 246 63 141	844
Mariar.	Pts. 175.220 220 11.15.15	175 139	876	67 40 52 56 157 169 130	716
Wagga.	Pts. 169 82 96 285 	255 204	1,105	105 48 85 41 207 261 90 162	1,001
Henty.	Pts. 165 56 99 267 27	21 167 145	947	138 85 137 196 327 57	1,020
Tumbarumba.	Pts. 817 89 298 864 52	18 164 230	1,610	270 208 322 323 334 34 288	2,001
Holprook,	Pts. 237 92 121 226 256	43 296 283	1,323	188 95 229 81 267 361 116	1,896
Calcairn.	Pts. 205 71 105 290 17 17 15	224 224 257	1,219	141 125 125 320 331 45 45	1,163
	111111	111	:	11111111	=
the state of the s	11111	í i i	Fallow	4:::::::	Crop
	J928—July July August September Oxtober November Docember	January February March	Tetal on I	April May June August September October	*Total on Crop

\* These figures include from the 1st April, but as most of the experiments were not sown till towards the end of April and most of the April rains fell during the drawn area, the first week, the smount that actually fell on the crop was much less than this total.

only the driest but was accompanied by many severe frosts, including one very heavy frost as late as the 22nd October, which damaged several of the experiment plots of wheat; the oats all escaped. The wheat plots at Holbrook and Walbundrie had to be cut, and those at Brocklesby, Henty and Gerogery were damaged to a more or less extent.

The crops that were sown early came away fairly quickly and obtained a good start, also most of those sown deeply. Late and shallow sowing did not give good results. Some of the crop sown late on heavy country did not show above ground until August and were very patchy. This was the case at Coolamon and comparable results were not obtainable there. The seasonal conditions were too much for the plots on the black soil, and those at Urana, Moulamein and the oats on stubble at Ganmain failed.

The rainfall for the year up to the 22nd December ranged from 10 to 16 inches and from 5 to 10 inches on the crop. The best results were obtained at Jindera, where 40-bushel yields were obtained on a 15-inch rainfall, while the yields of up to ten bags at Gerogery, Marrar, Milbrulong and Oaklands on a rainfall of 10 to 14 inches were very satisfactory.

#### Cultural Methods.

June and July ploughing gave the best results and those blocks which received a harrowing and a deep cultivation prior to harvest showed to advantage. Moderately deep ploughing of  $4\frac{1}{2}$  to 5 inches also gave good results. The land that was worked up by the rigid-tine duckfoot scarifier was in better order and cleaner, and where every opportunity was taken to work the fallows, the effort was amply repaid.

Gerogery.—Soil, red loam, undulating, old paddock (eighteen years), last crop wheat 1927; mouldboard ploughed July-August 4½ inches, harrowed September, scarified October, January and again in April. Sown with hoe drill 27th April, using 65lb. seed and 1cwt. superphosphate per acre. Harvested 16th December; Bobin and Union were frost damaged.

Jindera.—Soil, brown loam, old land (twenty years); last crop, wheat, 1926; mouldboard ploughed 4½ inches in June, harrowed August, scarified January, February and April. Sown with combine using wheat 70lb., oats 60lb. and superphosphate 90lb. per acre. Most varieties sown 27th April; Waratah and Duchess wheats and the oats were sown 4th May. Fed-off in June. The oats were grazed bare on 8th August; their recovery was remarkable. Harvested—oats, 4th December; wheats, 16th December.

Walbundrie.—Soil, brown to grey silty loam (eight years); last crop, wheat, 1927; mouldboard ploughed 4 inches in August, harrowed October, springtoothed April and sown with combine 30th April, with oats, 60lb.; superphosphate, 40lb. Harvested, 30th November.

Brocklesby.—Soil, brown loam, undulating, old paddock (forty years); last crop, wheat 1925, out two years; mouldboard ploughed 4½ inches September, harrowed October, scarified and springtoothed April. Sown with combine 10th May using wheat 75lb., oats 60lb., and superphosphate 84lb. Harvested 5th December. All wheat plots affected by frost; Waratah and Nizam over 50 per cent., while Yandilla King and Duchess had to be cut

Holbrook.—Soil, brown to grey loam on billabong, old paddock (twenty years); last cropped 1927 with wheat; mouldboard ploughed 5 inches in September, harrowed October, springtoothed November, and harrowed, disced January, springtoothed February and March, and again before sowing with hoe drill on 17th April with oats at 50lb. seed and 80lb. superphosphate per acre. Harvested 30th November.

Tumbarumba.—The wheat plots were on new land, red loam, granite and quartz, undulating; mouldboard ploughed 4½ inches July, disced and harrowed October, scarified March. Sown 1st May with combine using 75lb. seed, 70lb. superphosphate. Harvested 3rd January, 1930.

The oat plots were on red loam, undulating, of granitic quartz and volcanic origin, old land (eighteen years); last crop, oats, 1926; mouldboard ploughed 5 inches September, harrowed November, springtoothed March, and again in April. Sown with hoe drill 24th April, 70 lb. seed, 80 lb. superphosphate. Harvested 23rd December.

Henty.—The wheat plots were on brown loam, old land (over twenty years); last crop, oats, 1927; mouldboard ploughed 4½ inches July, harrowed September, scarified October, February, and again before sowing. Sown with combine 8th May, using 75 lb. seed and 90 lb. superphosphate per acre. Harvested 11th December.

The cats on stubble were on old land; previous crop, wheat, 1928; disced early March; harrowed and sown with combine 29th April, using 60lb. seed, and 60lb. superphosphate. Harvested 4th December.

Munyabla.—Soil, brown loam, undulating, old land (over thirty-five years); last crop, cats, 1927; mouldboard ploughed 3½ inches in Junc, springtoothed September and February, scarified April. Sown with combine 9th May, using wheat, 70 lb. seed and 112 lb. superphosphate, oats, 60 lb. seed and 70 lb. superphosphate. Harvested 23rd December, Algerian oats damaged by hail.

Uranquinty.—Soil, red loam, undulating, old land (fifteen years); last crop, wheat, 1927; mouldboard ploughed 4½ inches July, harrowed September, springtoothed October, scarified February and again in April twice. Sown with disc drill 1st May, using wheat 75 lb., oats 60 lb. and superphosphate 84 lb. Harvested 17th December.

Marrar.—Soil, light red loam, undulating, very old land (over thirty-five years); last crop, wheat, 1927; mouldboard roughs, 1 5 inches early June, harrowed August, scarified October and agin twice in March. Sown with combine 18th April, using wheat 75 lb. sed and 84 lb. superphosphate, oats 55 lb. seed and 50 lb. superphosphate. Hirvested 11th December.

Grong Grong.—Soil, red loam undulating, old land (fourteen years); last crop, oats, 1927; summer fallowed with tarifier (not ploughed). Scarified March and again in July, harrowed Oober and again in April, scarified May. Sown with combine 23rd May sing wheat 70 lb. seed and 84 lb. superphosphate, oats 60 lb. seed and 6 lb. superphosphate. Harvested 10th December.

Morundah.—Soil, red loam, heavy plain, old land (thirty years); last crop, wheat, 1927; mouldboard ploughed 4 inches June, springtoothed September, scarified October and again in April, springtoothed April, scarified in May, and sown with a hoe drill on 3rd May, using wheat 70 lb. seed and 84 lb. superphosphate, oats 60 lb. seed and 56 lb. superphosphate. Harvested 10th December.

Oaklands.—Soil, light red loam, flat country, very old land (forty years); last crop, wheat, 1927; mouldboard ploughed 4½ inches July and harrowed twice, springtoothed May, and sown with a combine on 8th May, using wheat 75 lb. seed and 84 lb. superphosphate, oats, 60 lb. seed and 60 lb. superphosphate. Harvested 18th December.

Milbrulong.—The wheat plots were on red loam, undulating, old land (twenty years); last crop, oats, 1927; mouldboard ploughed 4½ inches 1st June, harrowed August, springtoothed September, scarified October, February and April, springtoothed May. Sown with combine 10th May, using 75 lb. seed and 1 cwt. superphosphate. Harvested 12th December.

The oat plots on stubble were on red loam, very old land (thirty years); last crop, wheat, 1928; stubble burnt and disced March, harrowed April and springtoothed. Sown with hoe drill 1st May, using 60 lb. seed and 84 lb. superphosphate. Harvested 4th December.

Corowa.—Soil, brown loam, old land; last crop wheat, 1924; mouldboard ploughed 4½ inches July; smoodged and springtoothed September, springtoothed February and twice in April. Sown with hoe drill 1st May, using wheat 74 lb. seed and 112 lb. superphosphate, oats 60 lb. seed and 75 lb. superphosphate. Harvested 20th December.

Berrigan.—Soil, red loam, flat country, old land; last crop, wheat, 1927; mouldboard ploughed 4½ inches June, harrowed August, springtoothed September and February, harrowed February, springtoothed April, and harrowed, springtoothed again and harrowed before sowing with hoe drill on the 9th May, using wheat 75 lb. seed and 80 lb. superphosphate, oats 58 lb. seed and 60 lb, superphosphate. Harvested 6th December.

Finley.—Soil, red loam, pine and box plain country, old paddock (fifteen years); last crop, wheat, 1927; disc ploughed 5 inches May, springtoothed September, springtoothed, rolled and harrowed October, harrowed March. Sown 8th May with combine, using wheat 73 lb. seed and 100 lb. superphosphate, oats 40 lb. seed and 60 lb. superphosphate. Harvested 1st December.

Jerilderie.—Soil, red and black, mixed plain (heavy), new land; mould-board and disc ploughed 5 inches July, smoodged and harrowed September, graded January, springtoothed April and twice in May before sowing with a combine on 17th May, using wheat 70 lb. seed and 80 lb. superphosphate, oats 50 lb. seed and 60 lb. superphosphate. Harvested 12th December.

Mathoura.—Soil, heavy brown plain, six previous crops; last crop, oats. Summer fallowed; disced March, si, ngtoothed June, October and April. Sown with combine and harrowed on 3th May, using wheat 75 lb. seed and 84 lb. superphosphate. Harvested 14th December.

Balranald.—Soil, red mallee (sandy loam); five years; last crop, wheat, 1927; mouldboard ploughed 3 inches July, springtoothed August and April. Sown with a combine 24th April, using wheat 75 lb. seed and 80 lb. superphosphate, oats 40 lb. seed and 80 lb. superphosphate. Harvested 4th December.

#### Diseases.

Flag smut was particularly prevalent; it is usually so in a dry season, but occurred to a greater extent than was expected this year. Serious attention should be given to it in the Riverina. Foot-rot was also present, but there was not as much take-all as was expected. Bunt was not present in any of the plots. Mildew, rust and blight were hardly noticeable.

Nabawa again showed immunity to flag smut; Geeralying showed resistance, but was very much inferior to Nabawa in yields. Wandilla showed fairly high resistance. Exquisite was reported to be very resistant, but a good deal of flag smut was found in this variety in the plots at Munyabla. Varieties found to be rather susceptible included Marshall's No. 3, Turvey, Canberra, Waratah, Union, Gallipoli, Federation.

#### The Varieties.

Waratah this year was outyielded by two varieties, viz., Aussie (in the Henty district, to which it seems to be suited), and Bobin in nine other districts, from Uranquinty right out to Balranald. The yields of Bobin and Nabawa (two recent introductions) were most outstanding; these varieties are worth a trial if seed can be obtained.

Yandilla King again proved itself the best late variety for most soils. Marshall's No. 3 suits the lighter soils.

Duchess, another new introduction, showed great promise. It is a midseason variety with a medium straw and an attractive, well-filled, brown club head of good length. It strips well and is fairly hardy. Riverina is fairly flag smut resistant and has again given very good results at Morundah. Ranee and Rajah gave good results in the drier parts. Union was disappointing in several districts, but this variety was very much affected by flag smut this season.

YIELDS of Wheat Manurial Trials.

Manure per acre.	Gerogery	Jindera	Munyabla	Uranquinty	Grong Grong	Morundah	Milbrulong	Berrigan	Finley	Mathoura
	(Gallipoll).	(Bena).	(Aussie).	(Waratah).	(Waratah).	(Union).	(Union).	(Union).	(Union):	(Federation).
Superphosphate, 56 lb 84 lb 112 lb 140 lb No manure	bus. 19½ 20 26½	bus. 233 261 273 	bus. 201 263 271	bus. 20 17½ 21¾	bus. 8½ 11 8	bus. 101 81 101 	bus.  251 251 251 251	bus. 114 124 124 	bus. 10 10 11 61	bus. 32 43 43

YIELDS of Wheat Variety Trials.

Control   Cont	,	,																																
Die Gerogeny.  100 Honty.  101 Honty.  102 Honty.  103 Honty.  104 Honty.  105 Honty.  105 Honty.  106 Honty.  107 Honty.  108 Honty.  108 Honty.  109 Honty.  109 Honty.  109 Honty.  109 Honty.  100	Balranald.	bus,	:	: :	10	, ∞	. :	11	:	:	:	:	:	:	74	' <b>:</b>	:	9	7	:	:	12	:		: =	11	:	77	:	:	:	:		
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Purs. Durs.	Finley.	bus.	:	:	£06	113	10‡	11.	:	:	:	S-45	•	:	:	:	:	8	12	: ;	₹ 21,	ĨI.	113		::	114	:	164	:	:	:	:	_	
Dus. bus. bus. bus. bus. bus. bus. bus. b	Berrigan.	pns.	163	•	:	131	134	$12\frac{1}{4}$	` :	:	:	:	:	:	:	:	:	$10\frac{3}{4}$	154	:	:	145	13		::	144	:	:	:	:	:	;	-	
#221 #224 #224 #224 #224 #224 #224 #224	Corowa.	bus.	263	243	đ	273	223	213	$26\frac{3}{4}$	24	$29\frac{1}{4}$	' :	:	:	:	:	:	:	27	:	:	:	:		:	:	:	:	:	:	:	:	-	
264 414 *244 524 524 524 524 524 524 524 524 524	Milbrulong.	pns.	28	25	50	233	*	254	273	:	293	' :	:	:	:	:	:	$23\frac{1}{4}$	:	243	:	$23\frac{1}{2}$	:		:	: ;	27	:	:	:	:	:	-	
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2 26 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Munyabla.	bus.	:	:		281	343	24	32	33,1	:	344	:	$36\frac{3}{4}$	:	:	:	:	:	:	:	:	:		:	:	:	:	:	:	:	:		•
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0 derogery.	Brocklesby.	bus.	*244	:	*32	*143	*19	*28	:	361	*24	:	:	374	:	:	:	:	:	:	:	:	:		:	;	:	:	:	:	:	;		
	Jindera.	bus.	41	401	*	35	:	373	30 <del>1</del>	36	373	314	263	:	:	:	:	:	:	:	:	:	:		:	:	:	:	:	:	:	:	-	
Gallipoli  Duchess  Bobin  Waratah  Vizam  Vandilla King  Marshall's No. 3  Nabawa  Laguisite  Bena  Bena  Benny  Faquisite  Grabbark  Penny  Fribank  Grabbark  Fribank  Bal Barly  Grabbard  Bal Barly  Fribank  Friba	Gerogery.	bus.	263	32,	#21	*23	203	*191	33	273	:	:	:	:	:	:	:	:	:	:	:	:	:	***	:	:	:	:	:	:	:	:	_	
Gallipoli Duchess Bobin Waratah Nizam Nizam Vandilla King Marshalls No. fabawa Bana Bena Exquisite Garesley Federation Vi firbank Rederation (N.S. Federation Vi gerenong, Vic Raverina Rajah	1	-	:	:	:	:	:		:	:	:	:	:	:	:	:	:	:	:	:	:	<u> </u>	-uo	<u>∵</u>	:	:	:	:	:	:	:	ma-	-	
Gallipoli  Duchess  Bobin  Waratah  Waratah  Wizam  Union  Yandilla K.  Marshall's  Marshall's  Bena  Exquisite  Ganberra  Exquisite  Ganberra  Exquisite  Ganberra  Bald Barly  Geration  Federation  Federation  Federation  Federation  Ranee  Ona  Ranee  Turvey ( 'Iurvey ( 'Iurvey )  'Iurvey ( 'Iurvey )  Turvey ( 'Iurvey )			:	:	: :	:	:	:	ing	No.	:	:	;	•	:	:	:	:			:	( <u>)</u>	ت -	. Vi	;	;	;	:	erial	;	;	aocii	ż	
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			Gallip	Duche	Robin	Warat	Nizan	Union	Yandi	Marsh	Nabar	Aussie	Bena	Exqui	Gresle	Penny	Firba	Cambe	Bald	Geera	Duri.	Feder	Feder	gere	Haver	Kanee	Onas	Rajah	Huff's	Zealar	Turve	Turve	DIN.	

YIELDS	of	Wheat	Rate	of	Seeding	Trials.
--------	----	-------	------	----	---------	---------

Seed per acre.	Gerogery (Gallipoli).	Jindera (Bena).	Munyabla (Aussie).	Uranquinty (Waratah).	Morundah (Union).	Milbrulong (Union).	Berrigan (Union).	Finley (Union).	Mathoura (Federation).
60 lb	26½  22½	bus. 231 261 26	bus. 25½  26¾  26¼	bus. 20 17½ 18¼	bus.  81  7  73	bus. 243  251  25	bus. 13 12½ 11¾	bus. 94  10  9	bus 5 4;

#### Oat Variety Trials.

In eastern Riverina, Guyra again came out better than Algerian. It is a little earlier and comes away much more quickly. Mulga again proved itself the best all-round early oat. Belar is a very promising and attractive mid-season oat, being a good yielder, and possessing good hay qualities. Lachlan is a heavy yielder, but with a coarse husk and is not attractive. The straw also is coarse. The oats in eastern Riverina yielded particularly well and were unaffected by frost.

#### Oat Manurial Trials.

Oats again responded to manure in a similar manner to the last two-years. It appears that about 84 lb. of superphosphate gives the best results. The M17 mixture, containing 6.5 per cent. of nitrogen, did not give such good results as the nitro-superphosphate containing about 2 per cent. nitrogen for the third year in succession; neither of these gave as good results as 84 lb. superphosphate.

YIELDS of Oat Manurial Trials.

Fertiliser per	acre.		Uranquinty (Algerian).	Marrar (Lachlan).	Milbrulons (Mulga).
NT			bus.	bus.	bus.
No manure	-	** ***	$25\frac{1}{2}$		26₽
Superphosphate, 56 lb.	***		323	33 <del>1</del>	30
" 84 lb.			343		30}
" 112 lb.		•• •••	342		31
Nitro-superphosphate,	100 1ь, .		324	•••	294
	56 lb		·	33 <del>1</del>	
M17, 100 lb			301		29‡
M17, 56 lb	,			33 <del>1</del>	

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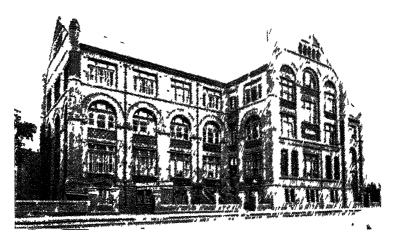
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YIELDS of Oat Varieties.

Balranald,	bus
Jerilderie.	bus 19 20 2.0 15
Finley.	bus. 2034 214 214 217 21
Ветіідзіг.	bus. 224 225 225 241
Corowa.	bus. 344 294 29 394 2955 2555 2555 2555 2555 2555 2555 25
;Milbrulong.	bus. 28 314 304 304
Oaklands.	bus. 48½
Morundah.	bus
Grong Grong.	bus. 123
Marrar.	bus. 26
Uranquinty.	588. 388. 388. 344. 
Munyabla.	63 63 63 63 63 63 63 63 63 63 63 63
;Henty.	Dus. 4444 4444 4444 4444 4444 4444 4444 4
Tumbarumba.	bus, 47, 45, 36, 36, 36, 36, 36, 36, 36, 36, 36, 36
Holbrook.	bus. 3624 4644 577 4444 
Brocklesby.	bus, 699½.
Walbundrie.	612 612 613 614 614 614 614 614
.s.19hail.*	bus, 45 1 25 1 25 1 25 1 25 1 25 1 25 1 25 1
Variety.	Algerian Belar Belar Buddah Gidgee Gidgee Guyra Melsalis Myall Myall Myall Sunise Embross Is.

\* These cats were grazed twice—very heavily on the 8th August; their recovery was remarkable.

Thanged hy Hall.

£ Sown on stribble land.

# Murrumbidgee Irrigation Area (Grifflth End).

E. B. FURBY, H.D.A., Agricultural Instructor.

Wheat and oat trials on the Griffith end of the Irrigation Area, and the surrounding dry area districts were conducted during the year with the co-operation of the following settlers:—

S. H. Kelly, Farm No. 529, Yenda.
T. S. Power, Farm No. 1311, Griffith.
C. A. Long, Farm No. 1589, Lake View.
J. Fuke, Farm No. 1622, Yenda.
V. A. Edwards, Farm No. 615, Griffith.
C. R. Harris, "Climsland," via Yenda.
A. J. Cruickshank, "Rothdene, via Yenda.
McNamara Bros., Griffith.
H. Mansell, Farm No. 1316, Griffith.
A. J. Currie, Farm No. 1615, Yenda.
G. Tyson, Farm No. 1644, Beelbangera.

#### Seasonal Conditions.

The past season was much the same as that of 1928; it was marked by a very low rainfall, though the ultimate results were better. A promising outlook in the autumn for a good season was, during the winter months, converted into one of almost complete failure as far as the dry area was concerned. Rainy periods during the months of August, September and October completely saved the situation, even though the total rain during these months was light. The almost total absence of rain during May, June and July, together with long series of heavy frosts, particularly later in the season when the wheat was coming into head, took heavy toll of the crop.

On the irrigation area early arrangements were made for a winter watering which was supplied in July. A further watering in September produced crops the like of which have not been seen over such an extensive area for quite a few years.

Although fallowed land was obtained for these trials where possible, the influence of the fallow on the crop was negligible. When it is considered that for the past three seasons only a very small percentage of the land sown each season has been fallowed land, giving no better results than stubble land, some idea of the state of the country may be imagined. Actually there has not been sufficient rain during these years to warrant fallowing, and it is not likely that there will be much crop sown on fallow for a few years at least. This country requires now an extremely wet winter to saturate the subsoil thoroughly before the fallows can be really successful as a means of producing heavier crops.

Although the rainfall in the various centres differed from that recorded at Griffith, the Griffith registrations which are given below can be taken as a guide to the general conditions which have prevailed.

# RAINFALL at Griffith.

Fallow Period.—April, 1928, 167 points; May, 154; June, 65; July, 54; August, 44; September, 66; October, 91; November, 14; December, 73; January, 1929, 64; February, 13; March, 106; April, 204 points. Total (July, 1928, to April, 1929), 729 points.

Growing Period.—May, 1929, 111 points; June, 36; July, 26; August, 144; September, 133; October, 77 points. Total, 527 points.

# Wheat Varieties for Grain-Dry Area.

Yenda (A. J. Cruickshank).—Soil, light red loam; under cultivation for a number of years, subject to a certain amount of soakage from higher land; disc-ploughed 5 inches September, 1928, springtoothed February, harrowed third week in April. Sown with combine 13th May; seed 60 lb., superphosphate 60 lb. per acre. Soil in good condition, germination fair.

Yenda (C. R. Harris).—Soil, deep red loam, pine and box country; one wheat crop previously harvested in 1926; sown in 1928, but crop failed and was fed off; mouldboard ploughed in June, 1928, combined September, scarified twice, the last working just before sowing. Sown with disc drill on 24th April; seed 60 lb., superphosphate 60 lb. per acre; harrowed after sowing. Soil in good condition, and rain a few days after sowing gave a good germination.

Griffith (McNamara Bros.).—Soil, heavy red 4 to 5 inches deep; not grown wheat previously; mouldboard ploughed August, 1928, harrowed March, spike rolled just before sowing with combine 3rd June, seed 60 lb., superphosphate 60 lb. per acre. This plot was delayed in sowing owing to the dry nature of the soil. A good germination was eventually obtained.

YIELDS of Wheat Varieties for Grain-Dry Area.

								•	
	Varie	ety.	,	Yen (A. J. C shar	ruick-	Yen (C. R. F		Griff (McNa Bro	mara
				bus.	lb.	bus.	lb.	bus.	lb.
Bald Earl	У					8	42	7	7
Riverina	•••			***		6	16		•••
Nizam	•••			8	28	7	58	. 7	22
Nabawa	•••			15	8	13	42	8	43
Union	•••			11	34	12	0	7	54
Federation	n	•••		11	<b>52</b>	6	36		•••
Waratah		•••		9	48	4	32	8	27
Bobin	•••			13	12			•••	• • •
Ford	•••			20	20				
Canberra	•••	•••		***				9	35
Gresley	•••	•••	•••	***	•••		· <b>·</b> 、	6,	32

# WHEAT VARIETIES FOR GRAIN-IRRIGATED.

Griffith (V. A. Edwards, Farm No. 615).—Soil, heavy red loam, pine and box country, previously orchard land; mouldboard ploughed February, 1929, watered in February, disced end of March; graded April. Sown with combine 9th May; seed 60 lb. and superphosphate 65 lb. per acre; condition of land when sown firm, but moisture content uneven. A good fall of rain following sowing gave a good even germination. The value of the autumn watering was manifested in the ultimate results.

YIELDS of Wheat Varieties for Grain-Irrigated.

Variety.			7	ield
·				bus.
Marshall's No. 3	•••		•••	33
Wandilla	• • •	•••	•••	40
Yandilla King	•••	•••		30
Nabawa				29
Rajah	•••	•••	• • •	28
Waratah	• • •	•••		25
Penny				25

Waratah and Penny in this trial did not receive a uniform watering in the spring, approximately one-sixth of these crops not receiving water.

# WHEAT VARIETIES FOR HAY-IRRIGATED.

Yenda (J. Fuke, Farm No. 1622).—Soil red loam; last crop oats in 1927, previously cropped for five years with wheat; ploughed 5 inches July, 1928; one-way disced October and again in February, 1929; graded three times and check banked end of February and disced lightly, springtoothed early in March and again mid-April. Sown with combine 20th April. Seed 60 lb. and superphosphate 60 lb. per acre. Germination only fair; crop watered in July and September, 1929.

Lake View (C. A. Long, Farm No. 1589).—Soil, red loam; wheat grown in 1926 and 1927, and barley for grazing in 1928; land watered and ploughed in January, 1929, disced just before and after rain at the end of March and graded. Sown 4th May; seed 60 lb. and superphosphate 60 lb. per acre; condition of land when sown was good with ample moisture, and a good germination was obtained, largely as a result of light rain one week after sowing. This crop was irrigated once late in the winter.

YIELDS of Wheat Varieties for Hay-Irrigated.

Var	iety.			Lake C. A.	View Long.	)		Yen (J. F	da. uke.)	
Marshall's No. Turvey Gallipoli Zealand Wandilla Yandilla King Improved Steir		•••	 t. 2 1 2 1 1	e. 10 10 3 13 14 17	q. 0 2 0 3 3 0	lb. 14 12 15 0 23 23	t. 2 1 2 1 1	c. 1 17 3 18 19 5	q. 0 0 0 3 2 2	1b. 0 0

# Fertiliser Trials with Wheat for Grain.

# DRY AREA.

Fertiliser trials were sown in conjunction with the variety trials, with Messrs. McNamara Bros., Griffith, A. J. Cruickshank and C. R. Harris, of Yenda. The cultural details for the plots are the same as for the variety trials. No results were obtained from Mr. Harris' plot.

# IRRIGATED PLOTS.

Yenda (S. H. Kelly, Farm No. 529).—Soil, heavy red; old cultivation land; previous crop rice, the stubble of which was burnt off in March, and the land ploughed 4 inches deep and watered; it was left in this condition till early May then disced. Seed sown with combine 6th June and harhowed; variety Waratah at 60 lb. per acre. This crop was watered in July and again in September.

Griffith (T. S. Power, Farm No. 1311).—Soil, red loam of fair depth; previous crop oats in 1928; disc ploughed end December, 1928; furrowed out and watered early in March; harrowed and cultivated three times at end of March. Sown with hoe drill 4th April; seed 60 lb. per acre; variety, Marshall's No. 3. A good germination obtained.

YIELDS from	m Wheat	for	Grain	Fertiliser	Trials.
-------------	---------	-----	-------	------------	---------

	Dry A	Area.	Trrig	ated.
Fertiliser.	Yenda. (A. J. Cruick- shank.)	Griffith. (McNamara Bros.)	Griffith. (T. S. Power.)	Yenda. (S. H. Kelly.)
No Manure	bus. lb. 6 12 8 10 8 35 5 40	bus. 1b. 5 0 6 45	bus. lb. 15 9	bus. lb. 10 0 10 0 11 0 11 0

# Fertiliser Trials with Wheat for Hay-Irrigated.

One fertiliser trial with wheat (variety, Yandilla King) was sown in conjunction with the variety trial by C. A. Long, of Lake View, the cultivation particulars of which have been previously given. The results obtained are as follows:—

	Fertiliser.				Yi	eld.		
				t.	c.	qr.	lb.	
No Manure			***	1	9	-1	10	
56 lb. super		e per acre		2	5	3	21	
112 ,, -	,	- <b>,</b> ,		2	6	1	5	
140				2	3	0	19	

# Wheat for Grain-Rate of Seeding Trials (Irrigated).

These trials were sown by Messrs. S. H. Kelly (Yenda) and T. S. Power (Griffith) in conjunction with the fertiliser trials, with the following results:—

	Rate of	Seeding	g.	Yen (S. H. ) Varie Wara	Kelly.)	Griffith. (T. S. Power.) Variety, Marshall's No. 3.
45 lb.	per acre *			 bus. 10	lb. 0	bus. lb.
60	* ,,		•••	 13	0	17 44
75	,,	•••	•••	 10	0	16 11
90	"	•••	••	 10	0	15 25

Oat Variety Trials-Irrigated.

Griffith (H. Mansell, Farm No. 1316).—Soil, red loam; old cultivation land; last crop oats in 1927; since used for grazing; irrigated in March and ploughed in April, worked into good tilth with harrows. Sown with hoe drill 15th May, seed 60 lb. and superphosphate 60 lb. per acre. This crop was not watered till late in the spring, with consequent poor results.

Yenda (A. J. Currie, Farm No. 1615).—Soil, heavy red gilgai; grew rice 1927-28; ploughed March and worked with disc and harrows; not watered before sowing. As the result of the previous rice crop this heavy soil worked up excellently and was in very good condition when sown 1st May with seed at 60 lb. and superphosphate at 60 lb. per acre. A good fall of rain a few days after sowing resulted in a good germination. The crop was watered once in the spring.

Beelbangera (G. Tyson, Farm No. 1644).—Soil heavy grey gilgai; last crop was wheat for hay, 1926; mouldboard ploughed July, 1928; no further working given till immediately before sowing, when it was springtoothed, working up in very good condition. Sown with disc drill 15th April and harrowed; seed 60 lb. and superphosphate 90 lb. per acre. Crop irrigated late in the spring.

YIELDS of Oat Variety Trials—Irrigated.

						Hay?	Crials.	•	•		Grain Trial.
Va	riety.		C		fith. ansell	).	(4	У А. J.	enda. Currie	·.)	Beelbang- era. (G.Tyson.)
Guyra			t. 0	c. 18	qr.	lb. 26	t.	e.	qr.	lb.	bus. 33
Buddah	•••		0	15	3	4	0	15	2	24	15
Belar	•••	,	1	1	0	0	1	4.	0	12	
Algerian		• •••	1	4	0	21	2	2	3	12	24
Gidgee	***		1	• 4	0	0	1	7	2	0	27
Mulga	***		0	9	0	0	0	17	2	10	21
Lachlan	•••						1	3	0	24	
Palestine	***							K+++4			36

A fertiliser trial with oats sown by Mr. Currie was not harvested owing to irregularities in the watering destroying the value of the experiment.

# Comment on the Trials.

Wheat Variety Trials.—The results of the trials on the dry area do not fully reveal the capabilities of the district for wheat production. A long series of adverse seasons has reduced fallowing to the lowest point of efficacy, and resulted in the continual use of stubble land. An increased infection of wheat diseases might have been expected from this. It is notable, however, that the amount of disease in the crops has been remarkably light, flag smut being the predominant disease, but even this was not sufficiently bad to cause any serious loss in yields. On the irrigated areas mildew was prevalent in many late-maturing varieties where the water lay about in pools. The damage, however, could not be considered serious.

The lighter soils of the dry area have given the heaviest yields. The excellent results obtained from Nabawa in all plots will soon place this variety in a pre-eminent position here. It is now being much sought after. Even on the irrigation area it appears that this variety may be useful. It has responded well to irrigation, and, although inclined to be weak in the straw on the dry area, no signs of weakness have been observed when grown under irrigation.

Waratah is distinctly losing favour here on the dry area, but retains a certain preference on the irrigation area. Although not recommended as a suitable variety for irrigation as compared with the late-maturing varieties, it gives good results when sown late.

Mr. Edwards' plots of Marshall's No. 3, Wandilla, and Yandilla King were good evidence of the stability of these varieties. The outstanding wheat on the dry area this season was Ford—sown for the first time in this district. Although the straw is inclined to be weak, it produces a good head and is comparatively free from flag smut. It should not, however, be sown too early.

The system of watering the land in the autumn for wheat has much to recommend it, provided the watering is not left too late. Water should be applied during February or early March, and the land cultivated and left till sowing time arrives. The least amount of rainfall then will ensure a satisfactory germination and the crop will hold out well during the winter however dry.

Fertiliser Trials.—Generally the fertiliser trials indicate that no added benefit accrues from an increase in the amount of fertiliser used above a standard quantity of approximately 56-60 lb., either on the irrigation area or on the dry area. Obviously the use of fertiliser has given increased yields in all cases, but it is unsafe to say that superphosphate can be used in large quantities with satisfactory and profitable results under present conditions.

In the hay trial the results are certainly outstanding, but the difficulty of evenly distributing water over the land played a big part.

Rate of Seeding Trials.—These were conducted under irrigation conditions. Mr. Kelly's plot, being on old rice land, much higher yields were anticipated. After the July watering, however, a very prolific growth of Wimmera Rye grass almost choked the crop out. Although rice land is

capable of very high production, the saturated condition of the soil can also be a serious detriment, as in this case. The yields from Mr. Power's plots indicate that from 45 to 60 lb. of seed gives the maximum returns. Due consideration to the time of sowing and the varieties employed must also be given. The condition of the land at sowing and the extent of the previous cropping are factors having a distinct bearing on the quantity of seed to sow.

Out Trials.—In selecting a variety to grow under irrigation it is difficult to go past Algerian, the general hardiness of this variety usually prevailing and ensuring a yield where other varieties fail. Even for grazing purposes this variety has distinct advantages where earliness of growth is not the main consideration. Observations on these trials would indicate that early maturity in varieties was not an essential quality in a suitable oat for the purpose for which oats are used here.

Although Guyra has not shown up too well, it is, nevertheless, a good hay oat, besides yielding a heavy grain crop. Palestine grew no more than 18 inches high and gave the highest yield—36 bushels per acre. This oat should be a very suitable one for the dry area here where grain would be the only requirement. It is very early and a fairly good drought-resister. At one time it was considered that Buddah might be a suitable oat here. but it has consistently failed. The varieties Belar and Gidgee are much more suitable.

# Murrumbidgee Irrigation Area (Yanco-Leeton End).

H. J. DARGIN, Agricultural Instructor.

The following farmers co-operated with the Department in conducting wheat and oat experiments on the Yanco-Leeton end of the Murrumbidgee Irrigation Areas and adjoining country during the season 1929:-

#### Irrigable Land---

A. E. Bowmaker, Farm 1429, Gogeldrie.

J. L. H. Davies, Farm 958, Whitton.

E. L. M. Facer, Farm 955, Whitton.

K. B. R. Harrison, Farm 1132, Caloro Field. A. Kingham, Farm 1445, Murrami. C. K. Lynos, Farm 1457, Murrami.

G. W. Scrider, Farm 1120, Caloro Field.

L. Snelson, Farm 383, Leeton.

F. H. C. Walsh, Farm 1464, Murrami.

M. J. Broadhurst, Farm 1031, Murrami.

W. J. Coughlan, Farm 200, Stoney Point. T. C. Davies, "Parkside," Brobenah.

A. D. Malcolm, Farm 1039, Colando.

Maybon Bros., Farm 559, Fivebough. E. McKenzie, "Allambie," Brobenah.

H. Paine, Farm 1119, Caloro Field.

J. H. Trethewey, Farm 30, Fivebough.

J. E. Williams, Farm 56, Leeton.

As was the case during the 1927 and 1928 seasons, the results obtained on non-irrigable country were again not up to the standard of previous years, owing to adverse seasonal conditions; wheat and oat trials failed on four properties, viz., Farms Nos. 1031, 1039, 1119, and 30, on this portion of the area, and no records were obtainable.

#### The Season.

Very little rain of any consequence fell during the fallowing period; from the beginning of June till the end of March only 606 points of rain fell, most of this being scattered showers which were very light and did nothing more than damp the surface of the soil. Those settlers on the dry area who were not prepared for ploughing operations after the 161 points of rain which fell during July, found it particularly hard during the following few months to turn over the soil, and a number of farmers throughout the non-irrigable areas waited for rain to enable them to carry out this work. Fortunately 80 points fell towards the end of October, which was of some assistance to these men, and enabled those with ploughed land to work their fallows and so conserve some little moisture.

Very little working was given the majority of fallows because there was insufficient rain to germinate weed growth or to warrant the use of implements as a means of conserving moisture.

During the first week in April, 192 points of rain fell, but most of the land was in such a dry state that this fall was insufficient, and even the early-sown varieties failed to germinate satisfactorily. The outlook was very serious indeed, as only a few showers fell prior to August, when 155 points were registered. Seed which had been in the ground for months commenced to germinate after this rain, and a further 151 points during September greatly assisted in promoting rapid growth of the wheat and oat plants. This rain, coupled with the long cool spring, undoubtedly saved the position for many dry area farmers who harvested from 8 to 14 bushels per acre from crops which only a few months previously appeared to be total failures.

As might be expected on the irrigable farms, excellent germinations and stooling of both wheat and oats were generally to be seen, and the subsequent waterings during July and September were partly responsible for the settlers producing the finest lot of grain and hay crops yet seen on this end of the irrigation area. Another feature greatly responsible for the increased yields on the irrigated land is the fact that larger areas of land, improved by rice crops, are becoming available to the individual settler each season. Stiff clay loams, which a few years ago only produced up to six bags of wheat per acre under irrigation, have now been properly graded and broken up to such an extent by the large fibrous rooting system of the rice plants, and have had such a large amount of humus deposited in them, that they are now producing, with good methods of cultivation, anything from 35 to 45 bushels per acre. The better the methods of cultivation on these rice lands, the better the yields of wheat and oats prove to be. At the present time yields of wheat up to 51½ bushels per acre are being produced on the experiment plots. It seems to be impossible to forecast just how

heavy the yields will be when the settlers are prepared to plough these fields early enough to enable the land to mellow down, and to otherwise prepare the best type of seed-bed. At the present juncture most settlers on large-area farms have their hands full throughout the year, laying out their properties, grading the land and otherwise preparing their farms for a rotation of crops. Once this work has been completed and the quick and even watering of these cereals can be carried out, some astounding yields will-result.

The season was so dry up to July that a special watering was made available to wheat-growers during that month and August. This was indeed a great improvement on the previous season when numbers of growing crops suffered through water not being available owing to necessary repairs to the main supply channels being carried out.

Severe frosts were experienced during the season, there being twenty-two in September, two in October (as late as 22nd and 23rd of the month), and one of 4.8 deg. on the 27th November. A little damage resulted in wheat crops, particularly on the dry area, particularly from those on 22nd and 23rd October.

The rainfall during the fallowing and growing periods was as follows:—
On the Fallow.—June, 1928, 36 points, July 161, August 36, September 52, October 116, November 12, December 61, January 32, February 55, March, 45. Total, 606 points.

On the Crop.—April 172 points, May 49, June 36, July 21, August 155, September 151, October 90. Total, 674 points.

On the dry areas the rainfall during the effective period was considerably less than the 606 points registered at Leeton, 4½ to 5 inches being registered, during scattered showers, by rain gauges in those localities.

# The Dry Area Plots.

Stoney Point (Farm 200).—Soil, red sandy loam 18 inches to 2 feet deep, subsoil red clay to gravel; cropped with oats in 1923, since used as grazing paddock; disc ploughed early September 3 inches; springtoothed carly April. Sown with combine 22nd May; harrows behind; seed 60 lb., superphosphate 60 lb. per acre; seed-bed very dry. Harvested 17th January. Yields of Canberra, Gresley, Clarendon, and Florence were slightly reduced by lodging, owing to having been unavoidably left standing too long, and of Bobin, owing to the presence of a couple of trees.

Brobenah (T. C. Davies).—Soil, red loam 6 inches deep, subsoil red clay to gravel; old cultivation land previously cropped to wheat in 1927; mould-board ploughed 4 inches during August, springtoothed mid-September, mid-March, and again 1st May. Sown with hoe drill 1st May and harrowed; 60 lb. seed, 60 lb. superphosphate per acre; seed-bed in good condition, although rain was badly needed. Harvested 20th December.

Fivebough (Farm 559).—Soil, red sandy loam 18 inches deep, subsoil red clay to gravel; had grown three crops of wheat previously, previous crop wheat 1928 (almost total failure); stubble cultivated deeply both ways with



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heavy springtooth during early May. Sown with drill 18th May, 60 lb. seed and 60 lb. superphosphate;; seed-bed was too fine and very dry. Harvested 17th December; yield of Riverina considerably reduced owing to lodging while waiting several weeks for other varieties to ripen.

Brobenah (E. McKenzie).—Soil, red loam 8 inches to 1 foot deep, subsoil red clay to gravel; previous crop wheat, 1927; mouldboard ploughed 3 to 4 inches 4th June; springtoothed September, harrowed November, springtoothed 15th March. Sown with combine, light harrows behind, on 1st May; 60 lb. seed, 60 lb. superphosphate; seed-bed in good condition, although very dry. Harvested 29th November; all plots badly affected by droughty conditions. Yields of Federation and Union were reduced by flag smut.

Fivebough (Farm 30).—Soil, red loam 6 inches deep, subsoil red clay; last crop wheat 1927; mouldboard ploughed 3 to 4 inches during June, harrowed August, springtoothed deeply October, scarified 2 inches 21st April. Sown with combine 4th May; seed-bed was in good condition, but very dry. Plots failed owing to drought.

Lecton (Farm 56).—Soil, light red loam 6 inches deep, subsoil red clay: last crop wheat 1927; mouldboard ploughed 3 to 4 inches early August, disc cultivated September, scarified February, scarified mid-May. Sown with combine 21st May, 60 lb. seed and 60 lb. superphosphate. Seed-bed was in good condition, but very dry. Harvested 14th December.

# The Irrigable Plots.

Gogeldrie (Farm 1429).—Soil, red sandy to clay loam 4 inches to 1 foot, subsoil red clay; old cultivation land, last crop Sudan grass 1927; disc ploughed 4 to 5 inches 28th August, disced lightly 15th June, irrigated 2nd April, disced lightly 20th May. Sown on 28th May with combine 2 to 3 inches deep, and harrowed, moisture being available at that depth; seed, 60 lb., superphosphate 60 lb. Harvested 30th November. The yields of all varieties were considerably reduced owing to uneven texture of the soil and insufficient grading of the land causing uneven watering. These plots were irrigated once only—at the end of July.

Whitton (Farm 958).—Soil, red sandy loam 18 inches to 6 feet. Had grown two crops of wheat previously, last occasion being for green feed, which was fed off with sheep during 1928; disc ploughed 4 inches mid-February, irrigated end of April, springtoothed early May, again end May. Sown with disc drill 4th June; 60 lb. seed and 60 lb. superphosphate. The plots were watered once only—at the end of July. Harvested 17th January. Yields of Gresley and Clarendon reduced by lodging, owing to having been left standing too long.

Whitton (Farm 955).—Soil, red to grey clay loam 2 to 6 inches deep, subsoil stiff red and grey clay, puff country; old cultivation land; last crop rice 1927-28 season; disc ploughed 4 inches January, irrigated early March, disced early April, harrowed mid-April. Sown with disc drill and harrowed 12th May; 60 lb. seed, 60 lb. superphosphate. Germination patchy owing to

insufficient grading of land causing uneven watering. Plots fed off with sheep during July. Irrigated twice—early September and early October. Harvested 19th January. Yields of all varieties reduced owing to poor germination on a number of puff banks, and with Duchess, Gullen, and Nabawa through lodging—left standing too long after ripening.

Caloro Field (Farm 1132).—Soil, red sandy loam 6 inches to 2 feet, subsoil red clay; last crop wheat 1927; disc ploughed 4 inches mid-November, 1927; disced late December, 1928, irrigated 20th February, part disced and part cultivated rigid tine end of March, harrowed after rain 7th April. Sown with disc drill 3rd June; 60 lb. seed and 60 lb. superphosphate. Owing to rice harvesting the sowing of these plots was delayed too long after watering the land. An uneven germination resulted, some of the seed striking in July; reduced yields of all varieties resulted. Plots were irrigated twice—at end of July and again in September. Harvested 19th December.

Murrami (Farm 1445).—Soil, red to grey clay loam 3 to 5 inches deep, subsoil stiff red and grey clay loam; last crop rice 1927-28 season; mould-board ploughed 3 to 4 inches December, 1928; sheep on land throughout; irrigated early March. disc cultivated mid-March, harrowed end March. Sown with combine 7th April; good seed-bed with moisture available; seed 60 lb., superphosphate 60 lb. These plots were twice eaten off quickly with sheep—at end of June and again end of July prior to watering. Harvested 14th December; all varieties were more or less affected with rust, but reduced yields did not appear to have resulted.

Murrami (Farm 1457).—Soil, grey clay loam 4 to 6 inches deep; subsoil stiff grey clay; last crop rice 1927-28 season; disc ploughed 4 inches August, 1928, irrigated early March, harrowed mid-March, springtoothed end April. Sown with hoe drill 2nd May in a splendid seed-bed; seed 60 lb., superphosphate 60 lb. An excellent germination and stooling of all plots resulted; growing crops irrigated twice—on 12th July and 4th September. Harvested 10th December. All plots showed a little stem rust, Penny being the worst affected, but no damage resulted, as this disease made its appearance late in the season.

Caloro Field (Farm 1120).—Soil, red clay loam 4 to 5 inches deep, subsoil stiff red clay; last crop wheat 1927; mouldboard ploughed 4 inches August, disced mid-December, irrigated end February, disced early March, springtoothed and harrowed end of March; sheep on fallow throughout. Sown with combine 6th May in good seed-bed, 60 lb. seed and 60 lb. superphosphate. Irrigated twice—end July and mid-September. Harvested 6th January, 1930.

Lecton (Farm 383).—Soil, red clay loam 4 inches deep, subsoil stiff red clay; cropped for past fifteen years; last crop rice 1927-28 season; mould-board ploughed 4 to 5 inches early December after irrigating, disced early February, springtoothed and rolled mid-March, springtoothed end April, again prior to sowing with drill on 20th May in a very dry seed-bed; 60 lb. seed and 60 lb. superphosphate. All plots with the exception of Bobin

YIELDS of Wheat Variety Trials.

Variety.						irrigable Plots.	riots.						Dry Area Plots.	lots.	10 m
•		Whitton.	on.		Murramî.		Caloro	Caloro Field.	Gogel- drie.	Leeton.	Leeton.	Five- bough.	Brol	Brobenah.	Stoney Point.
		Farn 958.	Farm 955.	Farm 1445.	Farm 1457.	Farm 1464.	Farm 1132.	Farm 1120.	Farm 1429.	Farm 383,	Farm 56.	Farm 559.	T C Davies.	L Mc- Kenzie.	Farm 200.
	- rd	s. lb.	bus. Ib.	bus. 1b.	bus. Ib.	bus. Ib.	bus. 1b	bus. Ib.	bus. 1b.	bus. Ib.	bus, 1b.	bus, Ib.	bus. 1b.	bus. 1b.	bus. 1b
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irrigated at end of July. Rain fell, so watering of this plot was not completed; a second watering was given at end of August. Harvested 19th December. There seemed to be just enough moisture in the ground to cause a quantity of seed of all varieties except Bobin to be destroyed by mould. Germination of all plots took place from end of June to late in July. Bobin came away last with a good strike and stooling.

Murrami (Farm 1464).—Soil, red to grey loam, subsoil red and grey clay to gravel; virgin land; disc ploughed 4 to 5 inches 26th January, spring-toothed 19th February, harrowed 5th April, graded 16th April. Sown with drill; Yandilla King 29th April, Waratah 10th June; seed trial, seed 57 and 70 lb., superphosphate 60 lb. Seed-bed in poor condition and very dry. Plots were irrigated twice—middle July and middle September. Harvested 11th January.

# Comments on Wheat Varieties.

Among the early-maturing wheats Waratah, which is still being used as the standard variety, appears likely to be displaced by Bobin on the dry areas. Rajah is also rapidly gaining favour on both irrigable and non-irrigable country, while Ranee—a variety which has only been tried out on this end of the Irrigation Area during the past two years—has also yielded well under drought conditions.

Federation, the standard midseason wheat, again did well on the plots on both irrigable and non-irrigable land, and Nawaba has also done well throughout these parts of the Riverina on both wet and dry country during the past two years, especially on account of its resistance to flag smut and its drought-resisting qualities.

Among the late wheats, the outstanding varieties were Yandilla King, Cleveland, Penny, Marshall's No. 3, and Wandilla. Yandilla King was again the most successful variety on both wet and dry areas, and is the most sought after wheat throughout this area for both hay and grain crops.

On irrigable country during the past few years it has been almost essential for late wheats to form the bulk of the sowings, because early-sown varieties receive the immediate benefit of the watering which is given the seed-bed during either February or early March; the land receives two or three cultivations after watering, and by early April the seed-beds are in excellent condition.

Numbers of settlers have grown Yandilla King under such conditions on practically the whole of the land they prepared for wheat during the past season, and the yields of both grain and hay have been exceptionally high.

# Rate of Seeding Trials.

A rate of seeding experiment was carried out on Farm 1464, Murrami, on virgin red to grey loam, 1 foot to 18 inches deep, which was representative of large areas of soil of this type in this locality, an early- and a late-sowing variety being used, viz., Yandilla King and Waratah. Two plots of Yandilla King were sown on the same day during April, one at the rate

of 57 lb. and the other 70 lb. seed per acre, 60 lb. superphosphate per acre being used in each case. The two plots of Waratah were sown on the same day early in June at the same rates.

The results were as follows:-

	Var	iety.		Seed.	Yield per acre.
Yandilla K Yandilla K Waratah Waratah	ling ling 	•••	 	lb. 70 57 70 57	bus. lb. 28 30 22 37 16 38 15 4

The germination and stooling of both plots of Yandilla King were good, and they made an even growth. Neither plot of Waratah showed above ground until late in July; the germination was fair, but the stooling was poor. An excellent sample of plump grain was harvested from the four plots on the 11th January, 1930.

# Oat Grain Variety Trials.

Oat grain variety trials on 2-acre plots were carried out on four farms. One of these failed owing to drought and no records were obtainable. The yields from the three groups of plots harvested, all of which were grown under irrigation, were as follows:—

YIELDS of Irrigated Oat Variety Trials.

Vari	leties.	Whitton. Farm 958.	Murrami. Farm 1445.	Caloro Field. Farm 1132.
Guyra Lachlan Myall		 bus. lb. 35 8 24 38 25 35 27 1	bus. lb 38 13 32 8 38 23 44 19	bus. lb. 36 28 54 15 47 33 45 11 57 20

Cultural details of the oat plots were as follows:-

Whitton (Farm 958, J. L. H. Davies).—Soil, red sandy loam 18 inches to 6 feet deep; previously cropped twice with wheat; last occasion 1928 for green feed; eaten off with sheep; disc ploughed 4 inches mid-February; irrigated end April; springtoothed early May, again end May. Sown with drill 6th June, 60 lb. seed, 60 lb. superphosphate. All plots irrigated twice—Middle July and end September. Germination and stooling of Algerian good, Lachlan was fair; Belar and Guyra did not stool well. Algerian ripened about seven days later than the other three varieties. Harvested 28th December.

Caloro Field (Farm 1132—K. B. R. Harrison).—Soil, light red loam 6 inches to 2 feet deep, subsoil red clay; previous crop 1927; disc ploughed 4 inches mid-November, 1927; disced late December, 1928; irrigated mid-February, disced lightly a week later, part disced lightly and part cultivated with rigid tyne end March, harrowed after rain 7th April. Sown with drill 3rd June in an excellent seed-bed, 60 lb. seed and 60 lb. superphosphate. All plots were irrigated twice—at end of July and end September. Palestine and Myall were slightly favoured by being on soil of even texture, and were of uniform height 3 feet to 3 feet 6 inches, while Mulga, Buddah and Guyra were very uneven, being anything from 2 feet 6 inches to 4 feet high; all plots were very dense.

Palestine was a particularly fine plot and was heavy, though it showed a tendency to lodge and shell slightly during the severe wind storms experienced for some weeks prior to stripping. Despite this it yielded 57 bushels 20 lb. per acre. The yields of Mulga, Guyra, Myall and Buddah were reduced through shelling badly, Buddah being much the worst in this respect. Harvested 9th December, 1929.

Murrami (Farm 1445—A. Kingham).—Soil, red to grey clay loam 4 to 5 inches deep, subsoil stiff red and grey clay; last crop rice 1927-28 season; mouldboard ploughed 3 to 4 inches December, 1928; sheep run on fallow; irrigated early March, disc cultivated middle March, harrowed end March. Sown with combine 8th April in a fair seed-bed 40 lb. seed and 60 lb. superphosphate. This rice land would have been in better condition had it been convenient to plough at least a few months earlier. Plots were irrigated twice—on 8th July and 15th September. Neither Palestine nor Gidgee, which were dense plots, showed signs of lodging or shelling. Myall both lodged and shelled rather badly, at least three bags per acre being lost, while Mulga, which was a dense plot, shelled even worse, during the severe wind storms which occurred during the latter part of the growing period. Harvested 4th December, 1929.

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F. Ferguson and Son, Hurstvi	lle	***	•••	***	1,500
R. Hughes, Ermington	•••	•••	***	•••	1,000
G. McKee, Ermington	***	***	•••	•••	3,000
L. P. Rosen and Son, Carlings	ord	(late of	Epping)	***	11,400
Swane Bros., Ermington	•••				500

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# Pure Seed.

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The Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney. not later than the 12th of the month.

Wheat—	
Aussie	J. Parslow, "Cooya," Balladoran.
Bald Early	Manager, Experiment Farm, Trangie.
Canberra	F. Penfold, "Bluevale," Boggabri. Manager, Experiment Farm, Condobolin.
Clarendon	F. Cornish, "Highfields," Glen Innes. C. F. T. Anderson, "Swan Vale," via Glen Innes.
Cleveland	W. Burns, "Goongirwarrie," Carcoar.
Federation	W. A. Glenn, Thyra Road, Moama.
Hard Federation	Manager, Experiment Farm, Trangie.
Improved Steinwedel	Manager, Experiment Farm, Trangie.
Marshall's No. 3	G. W. Forsyth, "Glencoe," Wallendbeen. F. Bauer, Bribbaree.
	B. J. Stocks, "Linden Hills," Cunningar. W. W. Wolter, Ryan, via Henty.
Nabawa	J. Parslow, "Cooya," Balladoran. A. D. Dunkley, "Bon Lea," Tyagong, via Grenfell. J. Carruthers, "Khan Yunis," Armatree.
Nizam	A. D. Dunkley, "Bon Lea," Tyagong, via Grenfell.
Queen Fan	C. F. T. Anderson, "Swan Vale," via Glen Innes.
Turvey	F. Odewahn, Culcairn.
Union	E. H. K. King, "Karrindee," Uranquinty.
Wandilla	H. J. Harvey, "Kindalin," Dubbo.
Waratah	F. Penfold, "Bluevale," Boggabri.
	Manager, Experiment Farm, Condobolin.
	J. Parslow, "Cooya," Balladoran.
	B. J. Stocks, "Linden Hills," Cunningar. Manager, Experiment Farm, Trangie.
	E. H. K. King, "Karrindee," Uranquinty.
	C. F. T. Anderson, "Swan Vale," Glen Innes.
Yandilla King	A. D. Dunkley, "Bon Lea," Tyagong, via Grenfell.
Oats	
Algerian	C. Bennett, "Theole," Forbes Road, Cowra
Belar	A. Scrivener, "Hildavale," Gunningbland.
Mulga	C. Bennett, "Theole," Forbes Boad, Cowra.

Onions—
Improved Hunter River
Brown Spanish ... S. Redgrove, "Sandhills," Branxton.
Early Hunter River White S. Redgrove, "Sandhills," Branxton.
Hunter River Brown
Spanish ... C. J. Roweliffe, Old Dubbo Road, Dubbo.

Watermelon—
Angelino ... ... J. C. Roweliffe, Old Dubbo Road, Dubbo.

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

# Unit Values of Fertilising Materials.

THE unit values of fertilising ingredients in different manures for 1930 are as follows:—

					$\mathbf{P}\epsilon$	er unit.
						s. d.
Nitrogen in nitrates	•••	•••				19 9
" ammonium salts		•••				14 10
" blood, bones, offal,	&с.	•••	•••	•••	•••	18 10
Phosphoric acid in bones, offal,		• • •			•••	<b>5 3</b>
,, (water solub	le) in	superph	osphat	е		4 10
Potash in sulphate of potash	•••	•••	***	•••		64

To determine the value of any manure, the percentage of each ingredient is multiplied by the unit value assigned above to that ingredient, the result being the value per ton of that substance in the manure. For example, a bonedust contains 4 per cent. nitrogen and 20 per cent. phosphoric acid:—

```
4 \times 18s. 10d. = £3 15s. 4d. =  value of the nitrogen per ton.

20 \times 5s. 3d. = £5 5s. 0d. =  ,, phosphoric acid per ton.

20 \times 5s. 3d. = £5 5s. 0d. =  , phosphoric acid per ton.
```

It must be clearly understood that the value thus assigned, depending solely upon the chemical composition of the manure, does not represent in all cases the actual money value of the manure, which depends upon a variety of causes other than the composition, and is affected by local conditions; neither does it represent the costs incurred by the manufacturer in the preparation, such as cost of mixing, bagging, labelling, &c. It is simply intended as a standard by which different products may be compared. At the same time it has been attempted to make the standard indicate as nearly as possible the fair retail value of the manurial ingredients, and it will be found in the majority of cases the price asked and the value assigned are fairly close.

It will be noted that with the exception of phosphoric acid and nitrogen in bones and bone products, the unit values show a considerable decrease compared with those obtaining in 1929.

The principal reduction is in the unit value of nitrogen in ammonium salts, which amount to 10.1 per cent.

The unit value of water-soluble phosphoric acid shows a substantial decrease (6.5 per cent.) on the value obtaining in 1929, and a decrease of 15.3 per cent. on the value obtaining in 1928. The unit value of potash shows a decrease of 3.8 per cent. on the value obtaining last year.

The unit value of nitrogen and phosphoric acid in bone products has increased 3.3 per cent. on last year's value. The price of the nitrogen is now 4s. per unit more than that in ammonium sulphate, and the value of the phosphoric acid 5d. more than water soluble.—A. A. Ramsay, Chief Chemist.

# The Bathurst Burr Seed Fly

(Camaromyia bullans, Wied.).

T. McCARTHY, Senior Assistant Entomologist.

In June, 1928, during the visit of the Better Farming Train to the Forbes district, Mr. R. Gibbes, of "Glenmore," Forbes, in a conversation with the writer, expressed the opinion that the seeds of the ill-named Bathurst Burr (Xanthium spinosum) were being attacked by some insect.

On account of the pestiferous and widespread nature of this introduced weed, it was thought that it would be of interest to record any insect attacking it, and, at the writer's request, Mr. Gibbes forwarded quantities of the infested seed from which many small trypetid flies were bred. A number of these flies were forwarded to the British Museum of Natural History for identification, and word was later received from the Dipterologist, Mr. F. W. Edwards, that he had identified the fly as Camaromyia bullans, Wied., which was not hitherto represented in the British Museum collections. He further stated that Hendel in his Monograph of Palæarctic Trypetidæ had said that this species occurred in South Europe and South America, but that its life history was unknown.

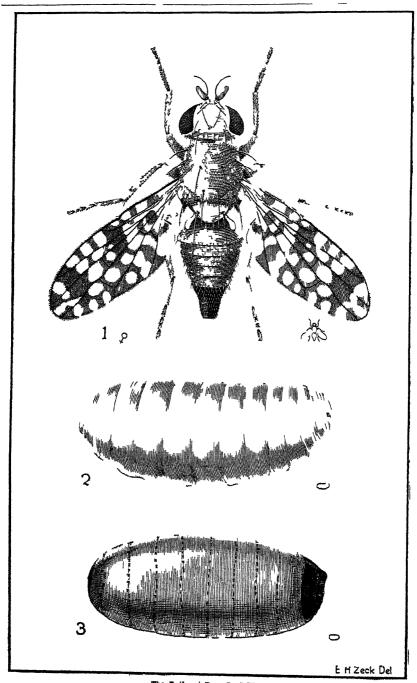
It is presumed that the fly was introduced into Australia from South America, as Maiden states that the so-called Bathurst Burr originally came in the tails of horses from Chili, South America.

Subsequent to breeding the fly from seeds obtained from Forbes, the writer bred it from seeds collected at Moorna Station, 25 miles west of Wentworth, and also from material collected at Bathurst, indicating that its distribution is widespread.

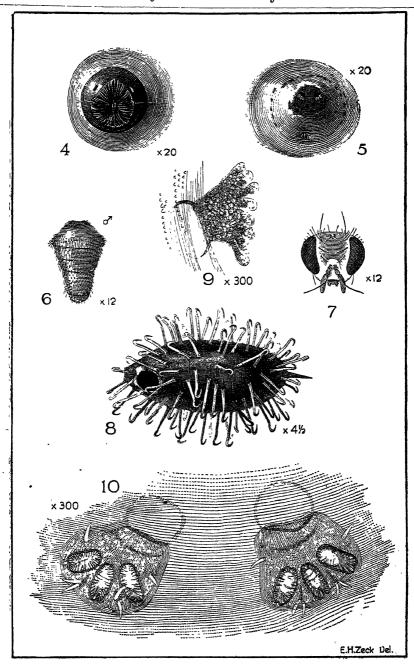
No attempt has been made to study its life history in detail, nor to estimate its economic status, and this note and the accompanying illustrations are published merely to record, for the first time, its occurrence in Australia.

The illustrations (by Mr. E. H. Zeck) show the various stages of the fly together with some details of the structure of the larvæ and the manner by which the fly escapes from the seed. It may be stated, however, that both seeds normally contained in the "burr" are occasionally infested, when two openings occur, but in most cases only one of the seeds is infested. In many cases, however, where only one seed was infested the other was only poorly developed and shrivelled.

It may be of interest to record here also that C. L. Marlatt, now Chief of the Bureau of Entomology, U.S.A., recorded the presence of a Trypetid fly (*Trypeta æqualis*) in Xanthium seeds in *Insect Life*; Vol. 3, Parts 7 and 8, p. 312, 1891, with illustrations. An account of *Trypeta æqualis* is also given in the *Proceedings of the Entomological Society*, Washington; Vol. 2, No. 1, pp. 40-44.



The Bathurst Burr Seed Fly. 1 Adult female



The Bathurst Burr Seed Fly.

4. Anterior end of pups. 5. Posterior end of pups. 6. Abdomen of male (dorsal aspect). 7. Head of adult male. 8. Seed, showing emergence hole of fig. 9. Anterior spiracle of larva. 10. Posterior spiracle of larva.

# Colouring of Oranges with Ethylene.

TREATMENT DOES NOT INCREASE SUGAR CONTENT.

A. A. RAMSAY, Chief Chemist, and L. A. MUSSO, Analyst.

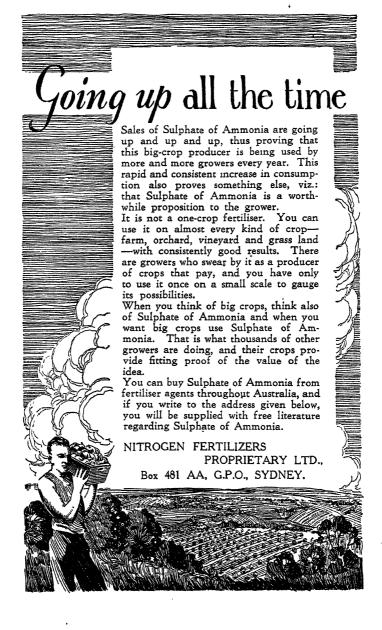
It was known several years ago that the green colouring matter in the skin of citrus fruits could be transformed into a bright yellow colour by placing the fruit in a small chamber or room in which an ordinary kerosene lamp was burning, and leaving them there for a certain length of time. The change in colour was brought about by some constituent or constituents of the products of the combustion of kerosene, and it was therefore of interest and importance to determine which constituent or constituents were responsible for the action.

As the result of carefully conducted experiments it was found that if the products of combustion were first passed through strong sulphuric acid, the gas or vapour issuing from the acid had not the power to effect the conversion of the green colour of the citrus fruit. Subsequently it was ascertained and demonstrated that the particular constituent responsible for effecting the colour change was a gas known to chemists as ethylene, olifiant gas, heavy carburetted hydrogen or ethene, which is present in very minute quantities in the products of combustion of an ordinary kerosene lamp.

This discovery soon found commercial and industrial application in America. Manufacturers prepared the gas and stored it under pressure in steel cylinders, which could readily be transported for the benefit and convenience of intending users—citrus packing houses and citrus growers—and was used by them to (a) hasten the colouring of mature, ripe citrus fruit and (b) to remove the small proportion of green colour present in mature oranges, since American citrus regulations provide not only that there be a prescribed ratio of sugar to acid in the fruit, but also that the fruit shall have the prescribed percentage of colour (yellow). Unfortunately, however, ethylene treatment was applied by unscrupulous persons to immature citrus fruit, and this practice has led to many prosecutions in America.

The use of ethylene gas has attracted attention in this State, but has not so far received industrial or extensive application. It is understood that a novel and interesting claim is being made by a distributing firm—possibly with a view to popularising the treatment—that ethylene treatment not only produces the desired colour, but also increases the sugar content of fruit so treated. In this connection, results of analyses showing the composition of "treated" and "untreated" oranges are not without interest.

The oranges analysed were second-crop oranges of the Parramatta variety, all taken from the one tree growing in an orchard at Dural (New South Wales). One portion of the crop was treated with ethylene and the other portion was untreated. One dozen oranges from each lot were



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submitted for examination, and the result of the chemical analysis is given below:—

Composition of	Ė	juice	of	"treated"	and	"untreated"	Oranges.
----------------	---	-------	----	-----------	-----	-------------	----------

	Treated with ethylene.	Untreated.
Cane sugar per 100 grams	grams. 1.46	grams. 1.90
Fruit sugar ,, ,, Citric acid (anhydrous) ,, ,, Other organic matter and soluble ash ,, ,,	$2.28 \\ 1.16 \\ 2.10$	1·94 1·20 1·98
Total solids ", ",	7.00	7.02
Total sugars expressed in terms of fruit sugar Ratio of total sugars (expressed as fruit sugar) to acid	3.82 grams 6.03 to 1	3·94 grams 5·85 to 1
C.C. of $\frac{N}{10}$ soda required for 10 c.c of juice	18-6	19-2
Percentage of juice	27.9 1 to 1.56	26.3 1 to 1.02

It will be noted that the cane sugar in the juice of untreated oranges (1.90) is slightly higher than in the juice of the treated oranges (1.46), the difference being 0.44. The fruit sugar in the juice of the ethylene treated oranges (2.28) is slightly higher than in the juice of untreated oranges (1.94), the difference being 0.34.

It appears that ethylene treatment has resulted in the conversion of a considerable part (23 per cent.) of the cane sugar originally present into fruit sugar (.34) and other organic matters (not sugar) (.12), with the result that the fruit sugar in the juice of the treated oranges is increased to 1.94 plus 0.34, viz., 2.28, and the other organic matter is increased to 1.98 plus 0.12, viz., 2.10. It is interesting to note that there has been no conversion of sugar to acid, for the ratio of "total sugars (expressed in terms of fruit sugar) to acid" is 3.29 to 1 in the case of juice from "treated" oranges and 3.28 to 1 in the case of juice from "untreated" oranges.

As the result of ethylene treatment there has been no increase in total sugars, but actually a slight diminution 3.94 as against 3.82. There has been an increase in fruit sugar, however, from the hydrolisation of the cane sugar present—a process the reverse of ripening.

# INFECTIOUS DISEASES REPORTED IN MARCH.

THE following outbreaks of the more important infectious diseases were reported during the month of March, 1930:—

Anthrax	•••		•••	•••			•••	2
Blackleg			•••	•••	•••	•••	•••	3
Piroplasmo	sis (tic	k feve	r)		•••	•••	•••	Nil.
Pleuro-pne	umonia	a conta	giosa	***		***	***	9
Swine feve	r	***			•••		•••	Nil.
Contagious	nnenr	nonia '						Nil.

-MAX HENRY, Chief Veterinary Surgeon.

# Egg-laying Tests at Hawkesbury Agricultural College.

(Under the Supervision of the Poultry Expert.)

TWENTY-EIGHTH YEAR'S RESULTS, 1929-30.

F. H. HARVEY, Acting Organising Secretary.

THE Twenty-eighth Egg-laying Competition at Hawkesbury Agricultural College commenced on 1st April, 1929, and terminated on 23rd March, a period of 357 days. The interval between the 23rd and 31st March makes it possible to remove the birds from the pens and provide for the accommodation of entrants for the next test.

The competition was controlled by a committee of management, comprising four officers of the Department of Agriculture and three competitors' representatives, namely, the College Principal (Mr. E. A. Southee), Messrs. E. Hadlington (Poultry Expert, Department of Agriculture), C. Lawrence (Poultry Instructor, Hawkesbury Agricultural College), C. Judson, W. M. Mulliner, and L. A. Ellis (competitors' representatives), and C. F. Houghton (Department of Agriculture), organising secretary.

# Scope of the Competition.

The competition embraced the usual four sections, was limited to pullets between seven and twelve months old on 1st April, 1929, and pens were allotted as follows:—

The P of the	Groups.	Birds.		Groups.	Birds.
Section A.  Open Light Breeds:— White Leghorns	55	330	Section C. Standard Light Breeds:— White Leghorns Section D.	5	30
Section B.  Open Heavy Breeds:— Black Orpingtons Langshans	. 20 . 5	120 30	Standard Heavy Breeds:  Black Orpingtons  Langshans  Totals	9	12 18 540

# Weight of Eggs.

The regulation that hens must lay eggs at least 2 oz. in weight each, and that eggs from groups must average at least 24 oz. per dozen within three months of the commencement of the test to be eligible for prizes resulted in the disqualification of thirty-six individual hens and three groups as follows:—

# Disqualified from Individual Prizes.

Heavy Breeds.—G. Bennett (No. 3), Mrs. V. E. Cox (No. 13), C. W. Gee (No. 19), G. E. Holmes (No. 28), Mrs. C. E. Madrers (Nos. 44, 45), L. Richmond

(No. 73), A. R. Sinclair (No. 84), J. W. Smiles (Nos. 85, 90), A. Thompson (No. 99), B. S. Upton (No. 108), A. R. Wheatley (Nos. 109, 111), Woodlands Poultry Farm (No. 115), W. Griffin and Son (No. 132), F. Upcroft (Nos. 518, 519), P. A. Barrett (No. 528).

Light Breeds.—A. W. Lewis (Nos. 153, 154), W. E. Strickland (Nos. 158, 162), F. A. Bailey (No. 164), W. S. Cartwright (No. 188), H. P. Christie (No. 203), D. R. Dove (No. 248), R. A. Jacobs (No. 297), John Murray (Nos. 364. 366), L. H. Rannard (No. 403), W. J. Scarboro (No. 432), Watson and Stepney (No. 455), W. J. Williams (No. 480), E. Watts (No. 500), H. Cole and Son (No. 508).

# Disqualified from Group Prizes.

Heavy Breeds.-F. Upcroft.

Light Breeds.—W. E. Strickland, J. Murray.

# The Financial Aspect.

The quantities of feed consumed by the 540 birds were as follows:-

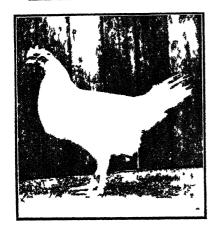
$\mathbf{W}$ heat	•••		333 bushels	26	lb.	Salt		267 lb.
Maize	•••		178 ,,	34	,,	Shell grit		23 cwt.
Pollard Bran	•••	•••	767 ,, 383	8	"	Green feed Epsom salts	•••	81 cwt 51 lb.
Meat meal	•••	•••	13 cwt.	78	"	Epsom saros	* ***	51 10.

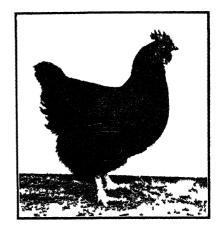
The cost of the foodstuffs, including freight and cartage, was £254 19s. 6d., equal to 9s. 5d. per head. In view of the fact that the College was in a position to buy some of the material under favourable conditions not available to private farmers, for the purpose of comparison the cost has also been computed, on the basis of ruling market prices, as £265 1s. 4d., equal to 9s. 10d. per head, including freight and cartage charges.

The value of eggs laid in the competition, calculated at Sydney ruling market prices for new laid eggs, less one penny per dozen levy as from 1st June, 1929, and the usual freight and commission charges, was £689 17s. 1d., equal to an average net price of 1s. 6d. per dozen.

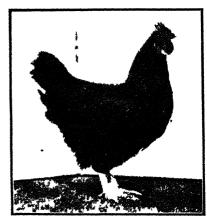
# Averages of Breeds.

No. of Birds.	Breed.	Breed. Eggs per Hen.			Value	e per	Hen.
		Open Lig	ght Breeds.	oz.	£	s.	d.
330	White Leghorn		205	25	1	5	1
		Open He	avy Breeds.				
120	Black Orpington		212	242	1	7	<b>'1</b>
30	Langshan		205	$25\frac{1}{4}$	1	7 6	0
		Standard .	Light Breeds.				
30	White Leghorn		210	25	1	5	11
•	-	Standard I	Heavy Breeds.			i.	, ,
12	Black Orpington		192	24	1	4.	8
18	Langshan		193	26	1	3	3
_							

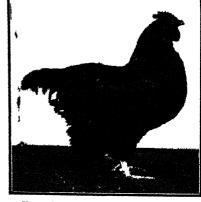












These of Mr. F. T. Wimble's White Leghorns Grand Champion Prize for laying eggs of greatest ca market value (£9 & 3d—1,496 eggs)

Three of Mr. C. Judson's Black Orpingtons. Golden Egg, 1930, trophy, awarded by the Metro politan Meat Industry Board

# Mortality and Disease.

The casualties due to deaths (forty-nine) and sickness (six) totalled fifty-five, as compared with fifty-eight in the previous year.

Particulars of the casualties in the various sections in the two years are as follows:—

		1928	3-29.	1929-30.		
		Light Breeds.			Heavy Breeds.	
Birds replaced Birds not replaced	 	16 20	4 18	12 15	11	

# Weights of Winning Birds.

The following are the weights at the beginning and end of the competition of the birds laying the greatest number of eggs:—

	Weight at April, 1929.	Weight at March, 1930
Groups.	lb. oz.	lb oz.
Light Breeds— (469	4 0	4 6
470	4 0	4 4
ID TO Windless White Franksons No. 1471	3 10	4 0
F. T. Wimble's White Leghorns, Nos $\begin{cases} \frac{271}{472} \end{cases}$	3 10	3 14
473	3 10	4 0
(474	4 2	4 2
Heavy Breeds— (25	5 12	6 0
26	5 0	5 4
G. E. Holme's Black Orpingtons, Nos 27	5 12	5 12
28		6 2
29	5 4 5 4 5 4	5 12
(30)	54	6 0
Individual Hens.		
Light Breeds—		
K. G. Cobcroft's White Leghorn, No. 213	4 0	4 4
Heavy Breeds—		
R. Bray's Black Orpington, No. 41	5 10	6 12

# The Monthly Laying.

Month.	Or	Section A. Open Light Breeds.		Section B. Open Heavy Breeds.		Section C. Standard Light Breeds		Section D. Standard Heavy Breeds.	
	Total for 330 hens.	Average per hen.	Total for 150 hens.	Average per hen.	Total for 30 hens.		Total for 30 hens.	Average per hen.	Total.
April, 192	9 3,684	11.2	2,517	16.8	338	11.3	268	8.9	6,807
May, ,,	4,948	15.0	2,916	19.5	518	17:3	453	15.1	8,835
June, ,,	5,178	15.7	3,011	20.1	544	18.1	529	17.6	9,262
July, ,,	5,469	16.5	3,130	20.8	490	16.3	547	18.2	9,636
August, "	6,765	20.5	3,336	22 2	633	21.1	669	22.3	11,403
September, ,,	7,353	22.3	3,423	22.8	677	22.5	717	23.9	12,170
October	7,358	22.3	3,111	20.7	685	22.8	594	198	11,748
November, ,,	1 6 795	20.4	2,623	17.5	638	21.3	511	17.3	10.507
December,	8 571	19.9	2,299	15.3	562	18.7	473	15.8	9,905
January, 193		18.0	2,213	14.7	541	18.0	376	12.5	9.091
February, ,.	1 640	15.5	1,703	11.4	412	13.7	350	11.7	7,107
March ,,	2 171	9.6	1.510	10.1	305	10.2	285	9.5	5,271
Year 1929-		205.6	-	212.0	6,343	211.4	5.772	195.7	111,745

# Annual Competition.

Full details of the financial and other results since the inception of the competition are given in the following comparative table:—

		No. of Froups.	Winning Total.	Lowest Total,	Highest Monthly Total.	Average per Hen.	Average Net Price of Eggs.	Average Value per Hen.	Cost of Feed per Hon.	Balance over Feed
1.4		20	1 110	450	137	130	1/1	15/6	61-	916
lst	•••	38	1,113	459				17/9	5:93	12;-
2nd	***	70	1,308	666	160 154	163 152	1/ <b>3</b> ≩ 1/-	12/9	4/51	8/3
3rd	•••	100	1,224	532		166	-/111	13/3	5/31/2	8/•
4th	•••	100 100	1,411	635	168 162	171	1/01/2	14/10	5/10	9/-
5th	***		1,481	721	161	173	1/21	17/2	7 -	10/2
6th	• •••	60	1,474	665		180	1/31	19/2	7/93	11/4
7th	•••	50	1,379	656	159		'		6/9	15:-
8th	•••	60	1,394	739	158	181	1/51	21/9	6 5 <del>3</del>	10/2
9th	•••	40	1,321	658	151	168	1/2	16/3½		
10th	***,	50	1,389	687	146	184	1/21/2	18/51/2	6/11/2	12/4
llth	•••	50	1,461	603	156	178	1'31/2	19/44	7/3½	12/0
12th	•••	50	1,360	724	152	177	$1/2\frac{1}{2}$	17/7	5/9	11/10
13ch	•••	63	1,541	705	162	181	1/2	17/81	6/91	10/11
14th	. "	70	1,449	506	165	192	1/41/2	22/2	7/7	14/7
15th §	A <sub>i</sub> B	40 30	1,526 1,479	924 749	162 165	216 192	1/3 <del>2</del> 1/3 <del>2</del>	28/8 <del>2</del> 21/7	6/10	16/10
(	Total	70				206	1/34	25/8	6/10	18/10
16th (	A	40	1,525	923	157	209	1/4	21/93	7 8	14/12
3	B Total	30	1,613	931	170	202	1/4	21/2	718	13/6
	A	70 40	1,448		159	206 199	1/4	21/6	7/8	13/10
17th \	B	30	1,517	860 815	153 151	189	$\frac{1}{5\frac{1}{2}}$ $\frac{1}{5\frac{1}{3}}$	$\frac{22/0\frac{1}{2}}{21/11\frac{1}{2}}$	7/10 7/10	14/21
(	Total	70	******		1	195	1/51	22 -	7/10	14/2
(	A		1,438	988	148	203	1 10	28/10	9 3	19/7
18th	B	50 3	1,428	745 977	151 138	190 195	1/10	28/1 27/8	93	18/10
Ì	D	7	1,336	955	150	191	1/10	28/5	9/3	19/2
į	Total	90				195	1/10	28/4	9/3	19/1
-	A B	33 47	1,516	996	167	206	2/2	37/11	12/8	25 3
19th	Č		1,488	955 944	168 148	204 195	22	37 11	12 8	25 3 23/4
1	D	5	1,298	1,020	150	193	2 2	35 9	12/8	23 1
٠., '	Total	1.	*****	•••		204	2/2	37/8	12/8	25  -
	AB	45 35	1,480 1,457	881 696	157 160	196 192	1/11	30/10	11/9	19/1
20th	( C	5	1,092	885		168	1/11	31 2 24 7	11/9	19/5 12/10
	D		1,370	1,092	147	197	1/11	33 5	11/9	21/8
	\ Total	*	1.405			193	1/11	30/8	11/9	18/11
Ø1t	( I	3 30	1,425			195 188	1/9	28 5 27 5	10/10	17/7
2lst	( . (	5	1,220	864	149	176	1/9	25/8	10/10	16/7
	Tota		1,212	i		187	1/9	27/3	10/10	16/5
,	. 400	4 00	*****	.,,	•••	191	1/9	27/10	10/10	17 -

EXPLANATORY NOTE -A, Open Light Breeds; B, Open Heavy Breeds; C, Standard Light Breeds; D, Standard Heavy Breeds.

# Annual Competition—continued.

	lo ( Groups.	Winning Total.	Lowest Total.	Highest Monthly Total,	Average per Hen.	Average Vet Price of Eggs.	Average Value per Hen.	Cost of Feed per Hen.	Balance over Feed.
$22 \mathrm{nd} \left\{egin{array}{c} \mathbf{A} \\ \mathbf{B} \\ \mathbf{C} \\ \mathbf{D} \\ \mathbf{Total} \end{array}\right.$	50 30 5 5	1,508 1,600 1,307 1,430	942 871 692 1,052	16J 164 142 152	210 203 170 205 205	1,6 1,6 1,6 1,6 1,6	26/3 26/3 21/1 26/9	9 9 9 9 9 9 9 9	16/6 16/6 11/4 17/-
$23\mathrm{rd} \left\{egin{array}{c} \mathbf{A} \\ \mathbf{B} \\ \mathbf{C} \\ \mathbf{D} \\ \mathbf{Total} \end{array}\right.$	57 23 5 5	1,470 1,558 1,291 1,308	961 1,006 950 1,049	160 164 146 159	212 211 180 192 209	1 8 1 8 1 8 1 8 1 8	25 11 28 7 29 2 23 5 27 5 28 3	9/11 9/11 9/11 9/11 9/11	16/2 18/8 19/3 13/6 17/6 18/4
$\mathbf{24th} \left\{ \begin{array}{c} \mathbf{A} \\ \mathbf{B} \\ \mathbf{C} \\ \mathbf{D} \\ \mathbf{Total} \end{array} \right.$	50 30 5 5	1,444 1,466 1,248 1,331	803 916 881 777	158	206 199 187 186 201	1/6 1/6 1/6 1/6 1/6	26,5 26,4 25,- 24,7 26,2	10/- 10/- 10/- 10/-	16/5 16/4 15/- 14/7 16/2
$\mathbf{25th} \left\{ \begin{array}{c} \mathbf{A} \\ \mathbf{B} \\ \mathbf{C} \\ \mathbf{D} \\ \mathbf{Total} \end{array} \right.$	29 5 5	1,531 1,519 1,319 1,326	797 753 1,092 842	162 161 147 155	209 204 173 203 205	1   8½ 1   8½ 1   8½ 1   8½ 1   8½ 1   8½	29 4 29 2 23 8 28 9 28 11	11/- 11/- 11/- 11/-	18/4 18/2 12/8 17/9 17/4
$egin{pmatrix} { m A} & { m B} & { m C} & { m C} & { m C} & { m C} & { m Total} & { m Total} & { m C} & { m Total} & { m C} & { m Total} & { m C} & { m Total} $	5 5	1,505 1,487 1,234 1,339	885 1,005 790 1,029	162 165 158 149	205 207 168 192 203	1/10 1/10 1/10 1/10 1/10	30/9 31/11 24/1 30/- 30/9	9 7 9 7 9 7 9 7 9 7	21   2 22   4 14   6 20   5 21   2
$27 ext{th} \left\{egin{array}{c} \mathbf{A} \\ \mathbf{B} \\ \mathbf{C} \\ \mathbf{D} \\ \mathbf{Total} \end{array} ight.$	25 5 5	1,531 1,386 1,302 1,259	868 954 914 883	173 163 147 155	201 201 177 176 198	1   9   5   1   9   5   1   9   5   1   9   5   1   9   5   1   9   5   1   9   5   5   1   9   5   5   1   9   5   5   5   5   5   5   5   5   5	30/2 30/11 26/6 26/1 29/11	8 7 8 7 8 7 8 7 8 7	21 7 22 4 17 11 17 6 21 4
$28 h$ $egin{cases} A \\ B \\ C \\ D \\ Total \end{cases}$	5	1,496 1,544 1,319 1,239	891 931 1,190 968 	161 165 151 160	206 212 211 196 207	1/6 1/6 1/6 1/6 1/6	25/1 26/11 25/11 23/10 25/7	9/10 9/10 9/10 9/10 9/10	15;3 17/1 16/1 14/0 15/9

EXPLANATORY NOTE.—A. Open Light Breeds; B, Open Heavy Breeds; C, Standard Light Breeds; D, Standard Heavy Breeds.

#### PRIZE LIST.

# GRAND CHAMPION PRIZE (Value £5 5s.).

For group of six birds laying eggs of the greatest market value, without replacement of a bird; each bird to lay eggs of prescribed standard of 24 oz. or over per dozen .--F. T. Wimble (White Leghorns), market value, £9 8s. 3d. (1,496 eggs).

#### GOLDEN EGG, 1930 (Value £25).

Presented by the Metropolitan Meat Industry Board, for group of six birds; points to be awarded for number, quality, and market value of eggs, also standard quality of the birds; each bird to lay eggs of prescribed standard weight.—C. Judson (Black Orpingtons), 1,475 eggs (64 points).

SPECIAL PRIZES.

RUNNER-UP CUP, value £10 10s. (donated by the Metropolitan Meat Industry Board) for the leading group, judged on the same scale of points, in the division opposite to the winner of the Golden Egg, 1930.—H. L. Abrook (White Leghorns), 58 points.

THE HADLINGTON COMMEMORATION MEDAL (donated by Mr. W. H. Paine, Superintendent, Animal Foods Department, Metropolitan Meat Industry Board), for the leading

group of six birds completing the competition and laying at least 1,100 eggs of prescribed weight, judged on type and breed characteristics, weight of birds on 1st August, 1929, and weight of eggs.—Mrs. G. J. Boyle (Langshans), 684 points.

THE JUDSON AND WIMBLEFORD SPECIAL PRIZES, of £3 3s. each (donated by Messrs. C. Judson and Son and F. T. Wimble for heavy and light breeds respectively), for groups scoring 1,350 eggs or more on points awarded according to individual laying from 225 eggs, all eggs to be of standard weight, and no entry from the donors to compete.—

Heavy Breeds.—W. W. Tennent (Black Orpingtons), 1,364 eggs (10 points). Light Breeds.—I. Lowery (White Leghorn), 1,482 eggs (12 points).

THE WIMBLEFORD THOUSAND, value £2 2s. first and £1 ls. second (donated by Mr. F. T. Wimble) for the first and second groups of White Leghorns to lay 1,000 eggs of standard weight, no entry from the donor to compete.—Mr. I. Lowery (White Leghorns), 1st £2 2s.; Mr. T. McDonald (White Leghorns), 2nd, £1 ls. (Mr. F. T. Wimble's own group filled second place, but was not competing.)





Two of Mr. H. L. Abrook's Pen of White Leghorns. Winners of the Runner-up Cup, donated by the Metropolitan Meat Industry Board.

THE W. M. MULLINER EGG WEIGHT PRIZE, value £2 2s. (donated by Mr. W. M. Mulliner) for the group laying the greatest number of eggs, with a minimum of 26 oz. and maximum of 28 oz. per dozen for each hen, eggs to be normal in shell, texture, and shape, and no entry from the donor to compete. (To be eligible for this prize the number of eggs laid by the group must not be less than 1,000).—Prize not awarded.

THE HADLINGTON AND ELLIS SPECIAL PRIZE of £2 2s. (donated by Messis. E. Hadlington and L. A. Ellis), one each for heavy and light breeds, for any group exceeding the previous highest score for any Quarterly Test in the College Competitions; no group belonging to the donors to compete for the prizes.—Prize not awarded.

THE "POULTRY" NEWSPAPER, value £2 2s.(donated by Poultry newspaper), for the individual hen which first lays 200 eggs of prescribed weight in the competition.—Mr. R Bray's Black Orpington, No. 41 (200 eggs in 222 days).

# QUALITY PRIZES (OPEN SECTIONS).

For highest scores from groups selected for standard points and laying at least 1,200 eggs of prescribed weight.

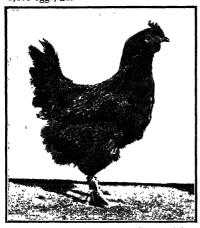
Heavy Breeds.—G. E. Holmes (Black Orpingtons), 1,544 eggs, £5; C. Judson (Black Orpingtons), 1,475 eggs, £2 10s.

Light Breeds.—Watson and Stepney (White Leghorns), 1,382 eggs, £5; H. L. Abrook (White Leghorns), 1,368 eggs, £2 10s.

# QUALITY PRIZES (STANDARD SECTIONS).

For highest scores from groups in the standard section, with a minimum of 1,100 eggs of prescribed weight.

Heavy Breeds.—Mrs. G. J. Boyle (Langshans), 1,239 eggs, £2; P. A. Barrett (Langshans), 1,179 eggs, £1.

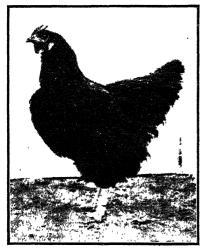


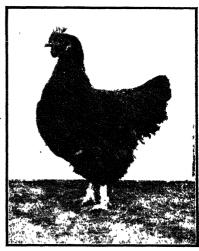


Representatives of Prize-winning Pens.

Left: One of Mrs. G. J. Boyle's pen of Langshans which won The Hadlington Commemoration Medal, and also the quality prize for heavy breeds in the Standard Section.

Right: One of Mr. E. Watts' pen of White Leghorns which won the quality prize for light breeds in the Standard Section.





Two of Mr. G. E. Holmes' Pen of Black Orpingtons. Winners of the highest group score for light breeds in the Open Section.

Light Breeds.—E. Watts (White Leghorns), 1,319 eggs, £2; J. Cornwell (White Leghorns), 1,301 eggs, £1.

HIGHEST AVERAGE PRIZES (GROUPS OF FIVE OR SIX BIRDS).

Heavy Breeds.—G. E. Holmes (Black Orpingtons), average 257 eggs, £3; C. W. Gee (Black Orpingtons), average 255.8 eggs, £2 10s.; W. W. Tennent (Black Orpingtons), average 255.6 eggs, £2; Mrs. C. E. Madrers (Black Orpingtons), average 247 eggs, £1 10s.

Light Breeds.—F. T. Wimble (White Leghorns), average 249 eggs, £3; I. Lowery, (White Leghorns), average 247 eggs, £2 10s.; F. T. Turner (White Leghorns), average 240 eggs, £2; J. Richings (White Leghorns), average 239 eggs, £1 10s.

GREATEST NUMBER OF EGGS (GROUPS OF SIX BIRDS).

Heavy Breeds.—G. E. Holmes (Black Orpingtons), 1,544 eggs, £3; C. Judson and Son (Black Orpingtons), 1,475 eggs, £2; 10s.; Mrs. C. E. Madrers (Black Orpingtons), \*1,467 eggs (average 24\frac{1}{2}\text{ oz.}), £2; C. W. Gee (Black Orpingtons), \*1,467 eggs (average 24\frac{1}{2}\text{ oz.}) £1; 10s.; B. S. Upton (Black Orpingtons), 1,390 eggs, £1.

Light Breeds.—F. T. Wimble (White Leghorns), 1,496 eggs, £3; I. Lowery (White Leghorns), 1,482 eggs, £2; 10s.; F. T. Turner (White Leghorns), 1,437 eggs, £2; J. Richings (White Leghorns), 1,431 eggs, £1; 10s.; B. L. Blake (White Leghorns), 1,426 eggs, £1.

#### HIGHEST INDIVIDUAL SCORES.

Heavy Breeds.—R. Bray (Black Orpingtons), 300 eggs, £2 10s.; W. W. Tennent (Black Orpingtons), 297 eggs, £2; G. E. Holmes (Black Orpingtons), 289 eggs, £1 10s.; B. Becroft (Black Orpingtons), 287 eggs, £1.

Light Breeds.-K. G. Cobcroft (White Leghorns) †290 eggs (average weight 26 oz.), £2 10s.; H. L. Abrook (White Leghorns), †290 eggs (average weight 25 oz.), £2; S. E. Daley (White Leghorns), 288 eggs, £1 10s.; J. Cornwell (White Leghorns), 286 eggs, £1.

# QUARTERLY (GROUP) PRIZES.

Winter Test (1st April to 30th June, 1929) :-

Heavy Breeds.-H. Martindale (Black Orpingtons), 437 eggs, £2; C. W. Gee (Black Orpingtons), 420 eggs, £1 10s.

Light Breeds.—H. L. Abrook (White Leghorns), 371 eggs, £2; W. J. Williams (White Leghorns), 369 eggs, £1 10s.

Spring Test (1st July to 30th September, 1929) :-

Heavy Breeds.—Mrs. C. E. Madrers (Black Orpingtons), 463 eggs, £1 10s.; C. Judson and Son (Black Orpingtons), 442 eggs. £1.

Light Breeds.-K. G. Cobcroft (White Leghorns), 426 eggs, £1 10s.; I. Lowery (White Leghorns), 424 eggs, £1.

Summer Test (1st October to 31st December, 1929):-

Heavy Breeds.—G. E. Holmes (Black Orpingtons), 400 eggs, £1 10s.; C. Judson and Son (Black Orpingtons), 396 eggs. £1.

Light Breeds. -B. L. Blake (White Leghorns), 473 eggs, £1 10s.; Kenrick Bros. (White Leghorns), 458 eggs, £1.

Autumn Test (1st January to 23rd March, 1930) :-

Heavy Breeds.—G. E. Holmes (Black Orpingtons), 329 eggs, £2; A. Thompson (Black Orpingtons), 284 eggs, £1 10s.

Light Breeds .- J. Richings (White Leghorns), 334 eggs, £2; K. G. Cobcroft (White Leghorns), 333 eggs, £1 10s.

\* Mrs. Madrers' and Mr. C. W. Gee's groups each scored 1,467 eggs, and the prizes were awarded on the average weights.

\* Messrs. Coberoft's and Abrook's birds each scored 290 eggs, and the prices were awarded on the average weight.

# Monthly Laying of Individual Prize Winners.

The following table shows the monthly laying of winners of the individual prizes for highest scores :-

Owner.						June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Total.
				He	ary	Bree	ds.				,					
:: :	::	,:: ••	.: ::	28 24 26	30 24 27 27	28 26 24 23	23 25 20 23	27 28 27 26	28 29 28 30	28 28 29 26	26 27 17 26	25 26 28 15	24 23 28 28	17 23 22 21	16 14 13 16	300 297 289 287
				Li	ght	Bree	ds.									
i.	:	**	**	19 24 19	21 23 24 24	21 17 24 26	28 25 24 23	24 26 26 28	28 28 26 23	30 29 27 28	27 27 25 24	28 27 26 28	28 26 26 24	22 23 18 22	19 21 18 17	290 290 288 286
	***************************************	:: :: : ::			### He  ###  ###  ###  ###  ###  ###  ##	### Heavy  ###################################	## Feary Bree   128   30   23   24   24   26   27   23   27   23   24   24   26   27   23   27   23   27   23   27   23   27   24   24   24   24   24   24   24	Heavy Breeds.    28   30   28   25	### Heavy Breeds.    28   30   28   23   27	Heavy Breeds.    28   30   28   23   27   28	Heavy Breeds.    28   30   28   23   27   28   28   28   29   28   24   26   25   28   29   28   28   27   28   29   28   28   29   28   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   28   29   29	Heavy Breeds.    28   30   28   23   27   28   28   26	Heary Breeds.  28   30   28   23   27   28   28   26   25   24   24   26   25   28   29   28   27   26   26   27   24   20   27   28   29   17   28   28   27   28   23   26   30   26   26   15    Light Breeds.  19   21   21   23   24   28   30   27   28   21   22   21   23   24   28   30   27   27   27   28   27   28   28   28   29   27   27   28   29   21   21   23   24   28   30   27   28   29   21   21   21   23   24   28   28   29   27   27   20   21   22   21   23   24   28   28   28   28   28   20   21   22   21   23   24   28   30   27   28   21   22   21   23   24   28   30   27   28   21   22   23   24   28   30   27   28   22   23   24   28   30   27   28   23   24   25   26   28   28   28   27   27   24   25   26   28   28   28   27   27   25   26   28   28   28   28   28   28   28	Heavy Breeds.    28   30   28   23   27   28   28   26   25   24	Heavy Breeds.    28   30   28   23   27   28   28   25   24   17	Heavy Breeds.  28   30   28   23   27   28   28   26   25   24   17   16   24   24   26   25   28   29   28   27   26   23   23   14   26   27   24   20   27   28   29   17   28   28   22   13   26   27   24   20   27   28   29   17   28   28   22   13   26   27   28   28   30   26   26   15   28   21   16    Light Breeds.  19   21   21   23   24   28   30   27   28   28   22   19   21   22   23   23   27   26   28   29   27   27   26   28   21   22   23   24   28   26   28   29   27   27   26   28   21   23   24   25   26   28   29   27   27   26   28   21   24   25   26   26   28   29   27   27   26   28   21   25   26   27   27   26   28   27   27   26   28   27   26   27   27   28   28   27   27   28   28

EGG-YIELDS OF EACH BIRD AND GROUP IN THE TWENTY-EIGHTH ANNUAL COMPETITION.

Owner and Breed.		<b>F</b> otals	of Iad	Totals of Groups.	Weight of Eggs per dozen.								
Open Section: Heavy Breeds.													
E. Holmes: Black Orpingtons Judson and Son: Black Orping- tons.	229 207	245 †243	271 233	*230 260	280 †255	289 277	1,544 1,475	oz. 24½ 25	£ s. d 9 18 10 9 6 5				
Irs. C. E. Madrers: Black Orping-	<b>‡23</b> 3	*285	*272	237	†204	286	<b>§1,467</b>	243	9 7 6				
tons.  tons.  S. Upton: Black Orpingtons  S. Upton: Black Orpingtons  Thompson: Black Orpingtons  Thompson: Black Orpingtons  W. Tennent: Black Orpingtons  Martindale: Black Orpingtons  Martindale: Black Orpingtons  F. Miller: Black Orpingtons  F. Miller: Black Orpingtons  Mr. V. E. Cox: Black Orpingtons  W. Bower: Black Orpingtons  G. and E. Whalan: Langshans  R. Wheatley: Black Orpingtons  E. Ross: Langshans  Mr. Sinclair: Black Orpingtons  Mr. Sinclair: Black Orpingtons  Mr. Sinclair: Black Orpingtons  Beneroft: Langshans  Beenrett: Black Orpingtons  Bridmond: Black Orpingtons  Brantett: Black Orpingtons  Bennett: Black Orpingtons  Bennett: Black Orpingtons  Woodlands Poultry Farm: Black	*282 214 254 230 *221 ‡161 276 273 *273 *25 *150 210 126 *225 \$139 \$119 \$119 \$119	200 226 185	270 203 *320 *386 222 266 209 229 200 176 225 *257 235 245 142 32 162 142 32 4231	275 235 256 281 251 243 208 248 200 228 208 †181 205 220 210 210 217 217	\$\frac{123}{246}\$ \$\frac{123}{123}\$ \$\frac{254}{220}\$ \$\frac{220}{198}\$ \$\frac{231}{229}\$ \$\frac{208}{248}\$ \$\frac{158}{1587}\$ \$\frac{199}{300}\$ \$\frac{199}{196}\$	252 *263 231 216 *284 211 248 211 248 211 248 157 *245 *157 *245 *169 201 162 201 162 218	\$1,467 1,390 1,364 1,356 1,355 1,341 1,313 1,309 1,296 1,241 1,184 1,168 1,139 1,121 1,095 1,095	24 12 12 12 12 12 12 12 12 12 12 12 12 12	9 10 28 8 17 8 18 12 11 8 8 12 11 8 8 18 11 8 8 11 8 8 11 8 8 11 8 8 11 8 8 11 8 8 11 8 8 11 8 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8 11 8				
J. H. Moxey: Black Orpingtons I. and H. Williamson: Black, Orpingtons.	101 †‡108	249	‡198 179	172 71	195 206	‡127 †118	998 931	25 244	6 2 1 5 13 1				
$O_{I}$	en Se	ection	: Lig	tht B	reeds.	• •	•						
T. T. Wimble: White Leghorns Lowery: White Leghorns T. Turner: White Leghorns Richings: White Leghorns Blake: White Leghorns I. McDonald: White Leghorns Watson and Stepney: White Leg-	261 265 215 261 240 246 199	264 241 223 278 236 1205 281	247 249 208 225 260 245 240	273 272 273 194 243 267 198	227 227 263 261 †201 202 *225	224 228 255 212 246 221 239	1,496 1,482 1,437 1,431 1,426 1,386 1,382	25½ 24½ 25½ 24½ 25 24	9 8 5 9 5 7 8 19 4 8 12 7 8 12 9 8 16 0 8 13 1				
horns. 3. Clarke: White Leghorns 4. L. Abrook: White Leghorns 5. B. Dent: White Leghorns 6. Chorroft: White Leghorns 7. G. Coheroft: White Leghorns 7. G. Christie and Son: White	202 147 198 159 220 ‡254	185 185 239 *256 195 229	226 235 223 260 \$290 209	250 263 237 236 225 233	250 248 238 227 209 *237	257 §290 231 225 222 187	1,370 1,368 1,366 1,363 1,361 1,349	25 25 25 24 24 25 24	8 9 8 8 15 7 8 5 8 8 4 0 8 0 <del>6</del> 8 8 8				
Leghorns. S. E. Dalev: White Leghorns W. J. Williams: White Leghorns D. R. Dove: White Leghorns I. Holmes: White Leghorns V. Rosso: White Leghorns L. A. Ellis: White Leghorns L. P. Toop: White Leghorns Lenrick Bros.: White Leghorns H. W. T. Hambly: White Leghorns W. J. Scarboro: White Leghorns Parkhill Poultry Farm: White	278 250 228 218 225 261 179 202 270 220 253	150 181 *270 222 236 211 100 240 188 250 †90	277 200 220 208 227 180 214 232 \$220 213 206	103 227 198 205 231 125 255 209 221 207 234	251 258 229 234 167 265 225 210 208 172 209	288 *220 190 232 229 259 227 193 164 *204 262	1,347 1,342 1,335 1,319 1,315 1,301 1,290 1,286 1,266 1,268	245 245 255 255 255 255 255 255 255 255	8 10 8 8 13 16 8 10 10 8 0 4 7 18 3 7 17 0 8 12 10 7 18 4 7 18 0 7 14 8				
Leghorns. Hilder Bros.: White Leghorns N. Mann: White Leghorns S. F. Cooling: White Leghorns L. Flew: White Leghorns Mrs. M. G. Cummings: White	176 242 259 200 ‡55	169 225 158 207 282	246 249 130 179 160	213 †147 218 234 220	214 255 242 195 256	223 1115 224 185 223	1,241 1,233 1,226 1,200 1,196	251 25 251 251 251	7 4 10 7 14 3 7 11 2 7 1 8 7 8 5				
Leghorns.  Carentree: White Leghorns  Rayner: White Leghorns  A. Wesley: White Leghorns  I. S. Thompson: White Leghorns  O. Ranch: White Leghorns  H. P. Christie: White Leghorns	210 252 ‡140 147 217 202	166 241 220 211 207 213	221 219 247 112 †116 204	184 \$145 105 281 231 209	199 228 207 239 167 148	214 108 263 188 239 204	1,194 1,193 1,182 1,178 1,177 1,175	241 251 25 25 241 25 25	6 16 4 7 3 10 7 12 4 7 2 5 7 3 0 6 16 1				

EGG-YIELDS OF EACH BIRD AND GROUP IN THE TWENTY-EIGHTH ANNUAL COMPETITION—continued.

Owner and Breed.		<b>Fotals</b>	of Indi	vidual	Hens.		Totals of Groups.	Weight of Eggs per dozen.	Market Value of Eggs.
Open Sec	ction :	Lig	ht Bi	reeds-	-cont	tinued	l.		
E. F. Goldsmith: White Leghorns C. Leach: White Leghorns Bide-a-Wee Pou try Farm: White	194 238 225	249 232 217	232 245 166	‡178 183 159	‡92 115 †182	227 209 207	1,172 1,172 1,156	0z. 241 25 251	£ s. d 6 15 6 7 3 9 6 11 3
Leghorns, B. A. Jacobs: White Leghorns L. H. Rannard: White Leghorns W. O. Hardy: White Leghorns W. O. Hardy: White Leghorns R. Whitelaw: White Leghorns F. B. Mullens: White Leghorns	224 *229 170 229 234 †136	238 228 224 \$199 186 199	*293 121 154 †120 168 247	†86 154 251 280 174 278	237 201 †155 160 165	‡74 215 192 204 213 169	1,152 1,148 1,146 1,142 1,140 1,106	241 241 25 251 251 251	7 5 10 7 3 4 6 14 3 6 16 11 6 12 9 6 19 7
A. W. Lewis: White Leghorns W. S. Cartwright: White Leghorns T. Buckley: White Leghorns J. Oates: White Leghorns A. E. Passlow: White Leghorns	241 239 160 204 214 76	177 *188 199 196 225 212	*151 218 ‡144 204 179 231	*160 95 178 235 244 165	218 162 185 123 157 159	158 177 179 82 5	1,105 1,079 1,045 1,044 1,024 999	24 25 25 25 25 26 26	6 5 7 6 13 2 6 4 3 6 5 4 6 6 9 6 5 10
A. Modes: White Leghorns J. Every: White Leghorns H. W. Jones: White Leghorns W. E. Strickland: White Leghorns J. Murray: White Leghorns	219 †235 192 166 135	186 256 42 *207 203	141 165 150 284 *118	148 174 169 1236 *229	237 117 222 251 255	122 80 116 *134 *215	953 927 891 *1,278 *1,135	25 25 25 25 23 23 23 23	6 0 3 5 17 10 5 11 8 7 19 4 7 3 0
Stan	dard	Section	on:	Light	Bree	ds.			
E. Watts: White Leghorns J. Cornwell: White Leghorns H. Cole and Son: White Leghorns J. H. Hayes: White Leghorns R. Newton: White Leghorns	243 204 161 73 284	*187 239 234 196 166	232 198 150 206 244	261 166 *287 246 212	211 208 †211 259 †62	185 286 242 212 222	1,319 1,301 1,285 1,192 1,190	24 24 <u>1</u> 26 <u>1</u> 24 <u>1</u> 24 <u>1</u>	8 4 5 8 2 5 7 16 8 7 6 9 7 6 1
Stan	dard i	Sectio	n: E	Teany	Bree	ds.			
Mrs. G. J. Boyle: Langshans P. A. Barrett: Langshans G. Hay Carr: Langshans W. M. Mulliner: Black Orpingtons F. Uperoft: Black Orpingtons	206 174 215 194 155	194 202 106 155 *217	203 205 192 202 *229	225 164 173 179 *194	174 205 199 159 265	287 *229 171 ‡79 270	1,239 1,179 1,056 968 *1,330	26 25 26 24 24 23	7 7 11 7 4 5 6 6 8 6 8 0 8 8 5

# COMMENTS BY THE POULTRY EXPERT.

While again no records have been broken in this test, it is pleasing to note a return to a higher general average for the competition, viz., 206.9 compared with 199-1 last year. The highest group score was put up by Mr. G. E. Holmes' pen of Black Orpingtons, which laid 1,544 eggs. The next highest group was Mr. F. T. Wimble's pen of White Leghorns, the total for which was 1,496. Thus, it will be noted that Black Orpingtons have come forward again to the leading position, after being beaten by White Leghorns for three consecutive years. They also put up the highest breed average for this test, viz., 212 eggs. As far as individual scores are concerned, the only birds to come up to the 300-egg mark were those of Mr. A. Thompson (320 eggs) and Mr. R. Bray (300 eggs). Mr. Thompson's bird, however, was ineligible for prizes owing to laying underweight eggs.

Signifies eggs are under prescribed weight of 24 oz. per dozen.
† Signifies bird replaced, score eliminated.
‡ Signifies bird dead, score retained.
§ In accordance with the regulations governing the competition, where there is a tie, the prize is allotted to the group or hen laying the heavier eggs.

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# SAVE THE COW

# PREVENT ABORTION

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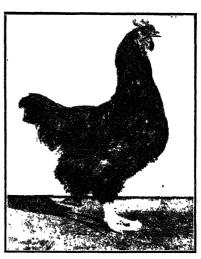
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#### Value of the Test.

Probably, if the opinion of poultry-farmers generally were obtained as to what is the chief point of interest in egg-laying tests, it would be found that high production performances take first place. In this regard the average laying over a period of years, in a competition such as at the Hawkesbury Agricultural College, where most of the birds are drawn from commercial farms, is certainly of value, being to some extent an indication as to whether the fecundity of the flocks is being maintained. On the other hand, however, individual record performances, while of interest from the point of view of world-wide rivalry, are of no practical value to the average poultry-farmer, because he is more concerned with a high flock average than a few abnormal producers, which, by reason of the constitutional effect of excessive production, are never likely to reproduce their like in numbers.

One of the most important factors in these tests, viz., average weight of eggs, is often regarded as of secondary importance by poultry-farmers when studying the results, but if the true significance of a lower average weight over a number of years were fully realised, more attention would be paid to this aspect, because it profits nothing to increase production if a larger proportion of the eggs are under-The weight of eggs in these weight. competitions must be considered as a reflex of what is occurring on commercial farms, and every effort should be made to improve in this direction. The lower average weight for light breeds in the Open Section (25 oz. this year as against  $25\frac{1}{2}$  oz. last year) and the same weight (25 oz.) for heavy



Mr. R. Biay's Black Orpington Hen. Highest Individual Score (300 eggs).

breeds, should be a warning of the necessity for greater care in the selection of breeding stock.

It was with a view to improvement in breeding that the Committee of the Competition decided to apply the 2 oz. weight standard for eggs to all the main prizes in the next test.

# The Chief Prize-winning Groups.

The Grand Champion Prize for the greatest market value of eggs was won by Mr. F. T. Wimble. The conditions governing this prize are that each bird in the group must lay eggs of not less than 2 oz. weight, and that no bird is replaced. Mr. Wimble's pen also laid the highest number of eggs in

the Open Light Breeds Section, viz., 1,496 eggs. The prize for the greatest number of eggs in the Heavy Breeds Section goes to Mr. G. E. Holmes with a score of 1,544 eggs.

For the third time Messrs. C. Judson and Son won the M.I.B. Golden Egg Trophy, valued at £25, which is awarded on points for standard quality of birds, also value and quality of eggs, all eggs to be not less than 2 oz. Messrs. Judson and Son also won this valuable prize in 1927, and again in 1928.

Mr. H. L. Abrook won the M.I.B. Trophy of £10 for the group in the section opposite to that winning the Golden Egg, which scored the highest number of points judged on the same basis as for the Golden Egg.

The J. Hadlington Commemoration Medal for the team laying at least 1,100 eggs of standard weight, and judged on points for quality and weight of birds and eggs, was won by Mrs. G. J. Boyle, with a pen of Langshans. This pen also won the prize for the greatest number of eggs in the Standard Heavy Breeds Section, the total being 1,239.

The prize for the group laying the greatest number of eggs in the Standard Light Breeds Section was won by Mr. E. Watts, with a score of 1,319 eggs.

#### The Financial Side.

The cost of feeding shows an increase of 1s. 3d. per head over last year, being 9s. 10d. compared with 8s. 7d. in the last test. These figures are based upon the ruling Sydney prices plus handling charges. The actual cost of feeding at the College was somewhat lower (9s. 5d.), owing to favourable purchases of foodstuffs.

Unfortunately, the average price of eggs is lower than last year, the figures being 1s. 6d. against 1s. 9½d. The difference, however, is not actually as great as the figures show, because this year deductions have been made in respect of 1d. Marketing Board Levy, as well as ordinary market. charges, whereas last year this deduction was not made.

# NEW BOOKS RECEIVED FROM THE PUBLISHERS.

THE following recently issued books have been received from the publishers. Farmers and students interested are requested not to write to the Department regarding the purchase of all or any of these, but to one or other of the city book-selling firms. Watch later issues of this Gazette for reviews of these books:—

Fungous Diseases of Plants in Agriculture, Horticulture, and Forestry, by Dr. Jakob Eriksson; 2nd edition; 526 pages, illustrated. 1930. (Publishers: Bailliere, Tindall, and Cox, London.)

The Soya Bean and the New Soya Flour, by C. J. Ferrée (revised translation by Ferrée and Tussaud); 79 pages, illustrated. 1929. (Publishers: William Heinemann (Medical Books) Ltd., London.)

Form and Industrial Tractors, by D. N. McHardy; 238 pages, illustrated. 1930. (Publishers: Crosby Lockwood & Son, London.)

# Poultry Notes.

E. HADLINGTON, Poultry Expert.

### PACKING, GRADING, AND MARKETING EGGS.\*

During the past two decades the poultry industry has developed from being chiefly a side-line operation to one of the leading primary industries of the State, having a value for products alone of about £4,000,000, according to official statistics. In the period under review there has been a wonderful improvement in housing and equipment on poultry farms, yet up till quite recently little improvement has been effected in the methods of marketing and distribution of eggs, which are the main product of commercial poultry farms. With the advent of the Egg Marketing Board, however, a better organised system of marketing has been evolved as far as the eggs from the area covered by its operations are concerned, but some revolutionary changes are still necessary, as our present system is out of keeping with the growing importance of the poultry industry. The recent amendments of the Marketing Act will strengthen the position of the Egg Board and permit of more effective steps being taken to ensure the supply of reliable eggs to the consumer. At the present time, the fact that it is not possible to purchase eggs at all times with full confidence that they will be all that could be desired in quality, is one of the main reasons why there is not a greater demand for eggs, and until all eggs are sold with a guarantee of quality and grade there will not be the demand that there should be for this valuable commodity, which ranks among the most nutritious of foods for human consumption. Even at the season of the year when eggs are highest in price there would be a greater demand if purchasers could rely upon always obtaining eggs of good quality, but numerous instances have come under notice in which a housewife has purchased a dozen eggs at a price of about 3d. each, only to find perhaps two or three bad ones among them, and she consequently limits the purchase of eggs to a minimum afterwards. It is usual in these cases to blame cold storage for all such eggs, whereas most of them were never in cold store, but probably came from some country source where eggs are handled in a haphazard manner, or they may even have been interstate eggs.

Most of this trouble could even now be obviated if consumers would insist on being supplied with "Board" eggs. Any complaints could then be dealt with by the Egg Board. However, until eggs from all sources are handled in a more systematic manner it will not be possible for all buyers to secure reliable eggs. In America, according to Mr. G. N. Mann, who has just returned from a tour of that country, there are several huge co-operative companies where eggs are sent just as they are collected from the

Notes of a lecture given at the Royal Agricultural Society's Show, Sydney, Agril, 1930.

nests, without any grading or cleaning. At these depots they are candled, graded, and the dirty eggs cleaned by sand blasting machines, after which they are repacked into clean cases ready for local sale, or into refrigerator cars to be sent to distant parts of the country.

In this connection it may be of interest to recall that in an address given at Hawkesbury Agricultural College Poultry Conference some years ago, Mr. J. Hadlington, dealing with the subject of marketing of eggs, said:—

I believe that when we have evolved a proper system of handling eggs it will be somewhat on this basis. The eggs will be gathered on the farm twice per day, will be carefully handled in all respects as indicated previously, and will receive more care in transit and on agents' floors. Next—and I desire to emphasise this point—they will be repacked into odourless fillers and flats, and properly tested and graded during the repacking, as is done for export. Then all eggs not sold within forty-eight hours will be run into chilling chambers, the temperature of which will not exceed 45 deg. Fah., and if they are to be kept any length of time the temperature will be not more than 33 deg. Fah. Under those temperatures they will be kept until required for distribution.

When such a method of handling and holding eggs has been evolved—and not until then—we shall be able to guarantee first-quality eggs to consumers.

In putting forward these expectations I am not overlooking the prevailing prejudice against cold storage, but my experiences, together with experiments which have been carried out, have satisfied me that the above changes in our handling methods are what is wanted. The sooner they are brought into operation the better. When the procedure outlined has come about, we will be quite surprised that anyone ever questioned the quality of properly cold-stored eggs and wanted them branded. Cold storage properly conducted, with eggs properly handled, will do for the poultry industry and for the housewife what it is doing for the dairyman and consumers of butter. Further, if the regulations are put into force which were asked for at the Bathurst Conference there is only one way to prevent half our eggs going to the inferior grade, and that is by chilling. When all this comes to pass both producer and consumer will look upon cold storage as a friend, and not as an enemy.

Probably at that time such a suggestion was thought to be Utopian, but as a matter of fact the Egg Board has just decided to arrange in the near future for all eggs which are now marketed through their agents to be handled on one floor under the Board's control. The intention is to clean, candle, grade, and stamp all such eggs and arrange for their disposal through existing agents. In order effectively to carry out this scheme it is intended to import a cleaning and processing machine from America, and engage an expert to come out with the machine.

# Grading Machines.

A factor which may assist the Board in establishing the new system of handling eggs is the advent of egg grading machines of local manufacture which are now available. These machines are being improved and operated by motor power instead of by gravity, as in the case of some earlier models. It is claimed that these power machines will grade the eggs as fast as they can be delivered into them, and as many grades as desired can be provided for. Attachments for stamping are also fitted, so that any brand required can be placed on the eggs.

Grading machines, if brought to the pitch of efficiency which appears likely, will go a long way towards revolutionising the egg industry here.

On the question of grading, it is not suggested that there should be more grades than at present, as it is considered that the existing grading is in the best interests of the producer and also the consumer. As far as the producer is concerned, any increase in the number of grades would mean a reduction in prices; the reason for this is that if a higher grade were adopted it would automatically take the place of the existing first grade in price, and all lower grades would be reduced in value. From the consumers' point of view, any increase in grades would cause more confusion. Even with the three present grades it is surprising how few purchasers are familiar with the different grades, the particulars of which are:—First grade—an average of 24 ounces per dozen, no eggs to be less than 1\frac{3}{4} oz.; second grade (medium)—all eggs to be between 1\frac{3}{4} oz. and 1\frac{1}{2} oz.; third grade (pullets)—to include all eggs below 1\frac{1}{2} oz.

# Cold Storage of Eggs.

Although at the present time there is a deep-rooted prejudice against cold stored or "chilled" eggs, it must be apparent to those in the egg trade that the storing of eggs in cool chambers will play a more important part in future in the stabilisation of prices and in ensuring to the public a regular supply of eggs at more uniform rates. The fact that the great bulk of eggs is produced between August and January, and that production reaches its lowest point in April and May, causes the consumers to look for cheap eggs in the flush season, but during the scarce season, owing to the high prices, the demand is curtailed. If no eggs were cold-stored for the dear season the supply of new-laid eggs would not equal even the reduced demand.

It has been proved beyond doubt that eggs can be cold-stored for six months or more without any serious deterioration if they are sound when placed in storage. Scientific investigations in Britain and America give promise of improvement in the storage of eggs by the introduction of carbon dioxide into the chilling chambers at intervals during storage, as it is found that eggs give off quantities of carbon dioxide as they increase in age, which results in deterioration of their quality through loss of density of the albumen and yolk. It has also been found that the keeping qualities of stored eggs has been enhanced by processing with oil before storage. The eggs are passed through a heated oil bath before being packed; this retards the shrinkage of the contents, and, to some extent, prevents the penetration of micro-organisms.

# Candling Eggs.

One of the most important matters in connection with the storage of eggs, both for local consumption and export, is effective candling, that is, examining the eggs before a strong light in a darkened room. A simple method of doing this is to have an electric light globe in a small box which has one or two holes made in the side for the eggs to fit against, so that the contents can be seen. By this means the size of the air cell and density of the albumen, which are the main factors in determining freshness, can be noted, and defects such as blood spots, shell fractures, porous shells, &c.,

can also be detected. It is only by such careful inspection that eggs from many farms, even in the county of Cumberland, can safely be packed for export during the spring.

# Care of Eggs on the Farm.

Much can be done by the poultry-farmer to preserve the quality of eggs going to the market, yet in some instances there is an astonishing apathy, or carelessness, in handling this perishable commodity. Poultry-farmers should do their share towards placing their product on the market in the best possible condition. To do this, one of the first considerations is the nesting arrangements—it is essential that sufficient nests be provided to prevent crowding, which causes breakages and dirty eggs. The nests should be kept clean, as should the houses, so that the number of soiled eggs is reduced to a minimum, because any dirt on the shells, particularly those which are porous, may lead to infection by harmful bacteria, thus causing the eggs to go bad quicker than if they were clean. The trouble would be accentuated if such eggs, while being washed, were allowed to stand soaking for any length of time in dirty water. This should be avoided by placing the eggs in a receptacle with a perforated bottom and immersing them in water for a few seconds, afterwards washing them in clean water.

Where heavy breeds are kept it is essential that broody hens be handled systematically, so that they do not sit on the eggs and thus cause deterioration, particularly if the eggs are fertile—if they were sat on for twelve hours incubation would commence, and of course the eggs would quickly go bad. To avoid this risk the best method to adopt is to have portable crates, with slatted bottoms and divided into two or three compartments so that each day's "broodies" can be placed in a separate compartment. It is important that all broody hens be caught each day. This not only helps in keeping up the quality of eggs, but saves loss of production, because by catching the hens as soon they go broody they will be off the brood again in a few days, whereas if they are allowed to sit for two or three days they will be off laying longer.

Another matter bearing upon the quality of eggs is that of correct feeding. For instance, if green feed is fed to excess in place of more nutritious food, this will lead to watery albumen in the eggs. On the other hand, a too highly concentrated ration will cause a greater percentage of blood spots, which are objectionable in a fresh egg and affect the keeping qualities. Again, a regular supply of suitable shell grit is an essential in ensuring sound shells.

Finally, the method of storing eggs on the farm awaiting despatch to market often leaves much to be desired. In this connection, leaving the eggs exposed to draughts and storing them in a room in which the temperature is too high are the main factors causing evaporation of the contents, and resulting in such eggs being classed as inferior. It should be made a practice to pack all eggs into the cases as soon as they have cooled

off after collection. The room in which eggs are kept should also be free from odours, as eggs become quickly tainted by absorption of any strong odour.

#### Packing.

In packing the eggs for market many breakages could be eliminated by the use of a little padding in the bottom and top of the cases, and also between the sides of the case and fillers, where the fillers fit loosely. One often sees eggs sent to market with only a cardboard flat on the bottom and top of the cases, leaving perhaps an inch of play between the top of the case and fillers, thus incurring risk of breakages. A good plan is to crumple up a couple of pages of newspaper and spread them evenly over the bottom of the case before putting in the first flat. Another similar pad on top, and if necessary a piece of crumpled paper between the fillers and sides of the cases, will ensure safer carriage. The ideal pads are those made of wood-wool wrapped in brown paper.

By observing these few simple points in the handling of eggs the producer can materially assist in placing reliable eggs on the market.

# AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to is ue. Alterations of dates should be notified at once.

		13	UV.			
Orange (G. L. Williams)	May	6, 7, 8.	Ungarie		Aug.	27.
Wingham (C. H. Blenkin)	,,	7, 8.	Junee (G. W. Scrivener)		Sept.	
Grafton (L. C. Lawson)	,,	7 to 10.	West Wyalong		,,	2, 3.
Hawkesbury Jubilee Show	"	8, 9, 10.	Murrumburrah		,,	2, 3.
Maclean (T. B. Notley)	,,	14, 15.	Parkes (L. S. Seaborn)		,,	2, 3.
Casino (E. Brallis)	_••	20, 21, 22.	Boorowa		,,	4, 5.
Trangie (F. H. Hayles)	June	3, 4.	Cowra	٠	,,	9, 10.
Narrandera Sheep Show (J. D			Barmedman		,,	10.
Newth)	July	15, 16.	Bogan Gate (J. a'Beckett)		,,	10.
Forbes Sheep Show	,,	16, 17,	Temora		,,	16, 17.
Cootamundra Sheep Show	,,	23, 24.	Canowindra		,,	16, 17.
Young Sheep Show (T. A. Tester)	,,,	30, 31.	Forbes (E. A. Austen)		**	16, 17.
Peak Hill (W. R. L. Crush)	Aug.		Barellan	• • •	. 27	24.
Gilgandra (G. Christie)	,,	12, 13.	Ardlethan	•••	Oct.	1.
Tullamore (S. D. Cameron)	**	13.	Quandialla		33	1.
Lake Cargelligo	17	19, 20.	Hay (George C. McCracken)		,,	1, 2.
Trundle (W. P. Forrest)	••	19, 20.	Narrandera (J. D. Newth)		,,	7, 8.
Illabo	٠,	20.	Bribbaree		,,	8.
Grenfell	٠,	26, 27.	Ariah Park	•••	,,	8.
Condobolin (J. M. Cooney)	17	26, 27.	Griffith		17	14, 15.
Wagga (F. H. Croaker) .	٠,	26, 27, 28.	Cootamundra	•••	,,	21, 22:
Gunnedah	,,	26, 27, 28.	!{			

1931.

Newcastle (P. Legoe) ... Feb. 17 to 21.

Some 259,594 dairy cows were tested in New Zealand in 1928-29 as compared with 224,130 in 1927-28, an increase of 35,464. The animals tested represented 20.1 per cent. of the total of the Dominion's dairy cows in milk, or 18.9 per cent. of all cows in milk and dry.

# Orchard Notes.

# MAY.

C. G. SAVAGE and W. LE GAY BRERETON.

THE month of May practically closes the fruit season for the grower of deciduous fruits. The apple-grower in the later tableland districts may still have some late varieties to pick, and perhaps a fair quantity to market, but the rush season is over and more attention can now be given to other work.

When closing down the packing shed for the season a general clean-up should be made with the idea of minimising the risk of carrying over the larvae of the last brood of the codling moth and fruit-fly to the next season. Such work as this is a very important factor in the control of both these pests. All cases, bins, and other receptacles that have held fruit during the season should be dipped under boiling water for at least three minutes. Packing-house equipment that cannot be dipped should be thoroughly examined, and any larvae found sheltering in holes and crevices destroyed.

Where at all possible, packing sheds should be made moth and fly proof. Then, if any moths emerge from the larvae which happen to have escaped the end-of-the-season clean-up they can be readily killed.

# Pruning.

Though, technically, it is better perhaps to delay pruning of deciduous trees till June, it is generally more economical to spread the work over a longer period by starting on those trees, such as apricots and peaches, which have already become dormant and lost their leaves.

Apart from affording a more economical distribution of the work, it is also a big advantage to get the pruning through early, so that undivided attention can then be given to ploughing and spraying operations during the latter part of the winter.

Where an orchard burner for the disposal of the prunings has not been installed, growers are urged either to buy or make one. The cost of making one is not great, nor is any particular skill required. Write to the Department of Agriculture for the free leaflet giving details of construction.

# Ploughing.

Where a green manure crop—either sown or volunteer—is not occupying the land, an autumn ploughing is an advantage, as it leaves the land in a fit condition to absorb the winter rains, and often allows the winter ploughing to be delayed until spring.

#### Pests.

Woolly Aphis.—In many localities the establishment of the parasite Aphelinus muli has made it unnecessary to spray for the control of woolly aphis. In other cases where the parasite has not been established, or where it is

inactive and has allowed the woolly aphis to become troublesome, it may be advisable to spray with tobacco wash or nicotine sulphate as soon as the trees have lost their leaves. As the parasite at that time is chiefly in the egg or pupal stage inside the aphid's body, the spray will do practically no harm to the parasite.

Codling Moth.—Reference has already been made to control of this pest by cleaning up the packing shed, &c., at the end of the season; but it is also advisable to examine the bandages on all pome fruit trees and destroy any sheltering grubs. Though it is compulsory to do this when removing the bandages between 1st June and 31st July, it is well to make sure of killing grubs which are at present hiding under the bandages. Even when this is done, it is not uncommon to find further grubs when the bandages are removed later on, especially if heavy rain is experienced in the meantime.

Citrus Scale.—Fumigation for red scale can still be carried out, but although a good kill is possible if the operation is carried out properly, much of the scale will still be adhering to the fruit at picking time.

# Strawberry Planting.

Though later planting of strawberries is now favoured by many growers, May was previously considered the best month for planting this berry. Provided the winter is not too severe, when planted in May the plants become sufficiently well established to yield a main crop the first season after planting. A free leaflet on strawberry culture is available on application from the Department of Agriculture.

# Cherries, with Particular References to Varieties.

The following notes concerning cherry-growing in the Young district have come to hand from Mr. S. A. Thornell, Fruit Inspector in that district.

In the Young district, he writes, large areas have been planted with cherry trees within the last few years, and the cherry position is undergoing a complete change. Whereas in the past a payable price was realised for medium to small fruits, the experience of last season proved these to be almost, if not wholly, unprofitable. Many returns for medium to small fruit ranged from 6s. down to as low as 2s. 6d. per 12-lb. box, while larger fruit ranged from 10s. to 7s. per box.

Most of the larger fruit for which the higher prices were obtained was produced on young trees just starting to crop, and should similar conditions prevail in coming years, growers who have old trees bearing medium to small fruit will be hard put to obtain payable prices. To better the quality of the fruit some form of pruning may have to be adopted, and perhaps it may also be necessary to manure the trees. The pruning would lessen the quantity of fruit, but it would certainly add to the quality. This would mean less, and consequently cheaper, handling when marketing the crop.

Careful consideration should also be given to the question of suitable varieties. Such varieties as Werder, Californian Advance, and Burgdorfs, which several years ago realised payable prices, are to-day worth very much less. Early Purple Guigne generally commands good prices for the first few consignments, but when the larger Burgdorfs come on to the market the Early Purple Guigne drops in price. The large Early Lyons overshadow the Burgdorfs, and the result is that many remain unpicked. The planting of Lyons is somewhat overdone at Young; they are, moreover, a risky variety, being so easily spoilt by rain. This has occurred several times in the last few years.

Eagle's Seedling follows the Lyons, and early consignments have been successfully shipped, the cherries being picked when turning pink but while still firm. One week later, when more matured and softer, they have at times barely paid expenses. Florence follows Eagle's Seedling, and is generally in good demand for shipping. St. Margaret's and Noble are next to reach the market, and on account of their size and appearance always sell well. In latter years the Napoleon Bigarreau variety has been purchased by a Melbourne firm for crystallising, the price paid being 8s. per ½-bushel case on rail at Young. This returns the grower about 5s. 6d. per ½ bushel, which is a payable price, as this variety is a heavy cropper, large trees producing up to ten ½-bushel cases.

In view of the foregoing, it would seem that the following points should be seriously considered:—Large fruit only should be grown, and the smaller varieties eliminated as much as possible. Mid-season varieties, such as Eagle's, should be marketed when firm, so that they could then be shipped, thus relieving any congestion on the local market. And with this same idea in mind, when consideration is being given to further plantings, shipping varieties, such as Florence, St. Margaret's, and Noble, should be kept in mind. Should the offer from Melbourne for crystallising fruits hold good for a number of years, Bigarreau Napoleon would pay to grow. Above all, small varieties must be eliminated, and to effect this in the case of varieties already planted, a system of pruning must be evolved to improve both size and quality, thus lessening the expenses in connection with picking, packing, and marketing.

Mr. Thornell points out that the expenses of marketing (cost of box, picking, packing, freight, &c.) a 12-lb. box of cherries is approximately 3s., whereas perhaps thousands of cases sold at 4s. and less last season.

General farming is an avocation involving numerous individual field operations, all of which contribute in varying degree to the financal success or failure of the season's work, and whilst in every-day practice the actual costs of individual operations are rarely taken into consideration, it is not without interest to place them on record when the means for doing so accurately are available.—A. J. Perkins in the South Australian Journal of Agriculture.

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1st June, 1930.

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# Virus or Degeneration Diseases of Potatoes.

C. J. MAGEE, M.Sc., B.Sc.Agr., Assistant Biologist.

ALL potato growers are familiar with the term "run out" as applied to any lot or variety of potatoes which tends to decrease in productivity when grown year after year. In the past this deterioration or degeneration of potatoes has been erroneously attributed to a variety of causes, e.g., unsuitable climate, unsuitable soil, senility brought on by continued vegetative

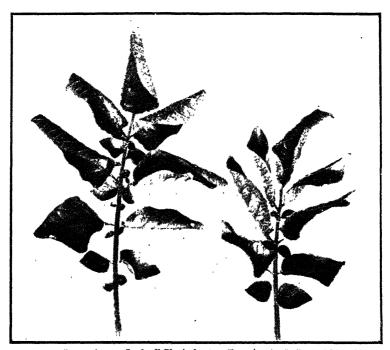


Fig. 1.—Leaves from a Leaf-roll Plant showing Characteristic Rolling of Leaflets.

[Photo by P. R. Maguire.

propagation, &c., but it is now known that certain types of infectious disease are mainly responsible for this behaviour. These diseases have been named virus or degeneration diseases.

Degeneration diseases are at present so widespread in the potato crops of this State that they constitute one of the most important problems with which growers have to deal. Each year they cause serious losses by depressing the acre-yield and by increasing the percentage of small tubers in the crop. Because virus diseases do not bring about wilting of plants or

the leaves of the plants. The rolled leaflets are stiff and rigid, paler in colour, and have a tendency to stand more erect than normal, giving the diseased plants an upright appearance. Owing to their thick and leathery texture, the leaves of leaf-roll plants have a characteristic rattle when brushed with the hand, and are harsh to the touch. The under surfaces of rolled leaflets frequently have a pinkish or purplish appearance, and drying up may take place at their tips.

Plants which have come from diseased seed-pieces are always stunted, due to shortening of the internodes, and this, together with their uprightness and rolled foliage, gives the plant a very characteristic appearance (Fig. 2).

Other diseases such as black-leg, rhizoctoniose and fusarium wilt may cause rolling of the foliage, but in these cases the rolling is generally only present in the upper portion of the plant, and is accompanied by wilting, excessive yellowing and premature death. Drought and extreme heat may also cause rolling of potato foliage. Leaf-roll plants do not wilt or die prematurely, and rotting of their tubers does not normally occur.

Tubers produced by leaf-roll plants are fewer in number and smaller in size than those produced by healthy plants. In certain varieties, however, the tendency is to produce one or two very large tubers and no small ones. A fairly characteristic symptom also is the shortness of the tuber-bearing stolons, and the fact that the old set is frequently found attached to the base of the stem in an unrotted condition when the crop is dug.

A spindling sprout condition (Fig. 3) is frequently shown by tubers from leaf-roll plants, when sprouted. This condition may also be seen in tubers which sprout under unfavourable conditions (high temperature and absence of light), or which are infected with the fungus Fusarium—the common cause of wilt.

The foregoing description refers to "primary" leaf-roll which results from the planting of infected tubers, and is the usual form of the disease. When a healthy plant becomes infected in the field from a neighbouring diseased hill there may be no outward sign of the disease during the current season. Tubers from such a plant will, however, give rise to plants showing primary leaf-roll the following season.

In some cases, if infection takes place early, the disease will become evident during the latter part of that season, as an upward rolling of the topmost leaves. This form of the disease is known as "secondary" leaf-roll, and as a rule does not cause a great deal of reduction in yield, but is important as tubers from plants so affected will show the more severe form of the disease in the following season. Secondary leaf-roll may easily be confused with the rolling of the foliage of healthy plants caused by hot, dry weather, but in the latter case the rolling is general throughout the crop.

In the case of secondary leaf-roll, all tubers produced by a plant may not carry the disease. It has been found that some tubers from a stalk may be healthy, while others are infected. It is assumed from this that the movement of the virus within an infected plant takes place slowly, and sufficient

# Bean Variety and Manurial Trials, 1929.

# Tweed Wonders on Farmers' Experiment Plots.

J. DOUGLASS, H.D.A., H.D.D., Agricultural Instructor.

EARLY beans are perhaps the most widely grown of all vegetables in the coastal area of New South Wales. This crop is an exceptionally good money-producer, and over a number of years is the most reliable source of income for many small farmers, young orchardists, and others in the coastal districts. In the vicinity of Gosford alone, well over 1,000 acres are devoted to this crop each year, while even larger areas are grown on the far North Coast. This crop has always been, and will continue to be,



Tweed Wonders Showing Heavy Flowering in Early Stages.

of much importance to New South Wales, and the Department of Agriculture is endeavouring to assist farmers to grow the crop to greatest advantage by dispensing advice and carrying out field tests.

One of the biggest expenses in bean growing is the cost of seed; last season £3 per bushel was paid for seed of very doubtful origin. An enormous amount of money leaves the State each year for the purchase of this seed, and one of the aims of the Department is to keep that money in the State for local growers. The bean crop at present is subject to some very serious diseases, and it can be safely stated that the trouble in most cases arose from the use of inferior seed.

# Tweed Wonder Variety Trial.

Last year tests were carried out with Tweed Wonder bean seed with the object of comparing yields with those of the standard variety Canadian Wonder. The amount of seed available greatly limited the number of supervised trials, although a number of small, unsupervised trials were carried out in various districts. The results are shown in the following table:—

	J. Parry,	Terrigal.	H. Eastwo	od, Tascott.	A. H. Tuck	er, Holgate.
Pickings.	Canadian Twee Wonder.		Canadian Wonder.	Tweed Wonder.	Canadian Wonder.	Tweed Wonder.
October 14 November 30 ,, Total,	7 10 1 0	bus. lb. 2 11 22 2 1 17 26 8	bus. 1b. 4 15 16 12 4 7	bus. 1b. 3 4 22 10 4 10	bu lb. 5 13 9 20  15 11	bus. lb 10 16 15 11 26 5

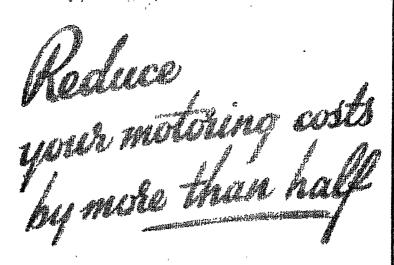
YIELDS in Tweed Wonder Trials.

NOTE.—The area of each plot was one-tenth of an acre.

The differences in yields in favour of Tweed Wonder were 10 bus. 20 lb. at Terrigal, 4 bus. 10 lb. at Tascott, and 10 bus. 16 lb. at Holgate. At 8s. per bushel, the increased returns would be £4 7s. 4d., £2 3s. 8d., and £4 5s. 10d., respectively.

The three experiments under review were all sown during the late winter with the object of producing early "local" beans for the Sydney market. The difficulties with this particular crop are due to unseasonal or rather unnatural growing conditions for beans experienced during late June, July, and August. Although the major portion of the Gosford district is frost free, the growth of the early bean crop is slow. Difficulty is often experienced in obtaining a satisfactory germination, which is to some extent influenced by the quality of the seed. It is interesting to record that in every case Tweed Wonder produced a much more satisfactory germination than the Canadian Wonder. Furthermore, owing to the early period of growth, the bean crop is usually pale in colour and demands a good deal of cultural attention, but Tweed Wonder produced a very robust dark-green bush and the early growth was very good. The quantity of the first pickings varied; in some cases Tweed Wonder was earlier than Canadian Wonder, while in other cases the reverse was the case.

Mr. Dave F. Gray, of Kincumber, who co-operated with the Department, reported that Tweed Wonders germinated better, made better early growth, and produced 50 per cent. more beans from the early picking. Canadian Wonder, he claimed, was a more persistent bearer, eventually producing as much bush as Tweed Wonder, but was about 25 per cent. below it in yield. Other growers reported that Tweed Wonder was superior in yield, but matured about the same time as Canadian Wonder.



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time may not elapse for all tubers to receive infection. On account of this slow movement of the virus, tubers for seed purposes are often dug while still immature and before the vines have died.

# Losses Due to Leaf-roll.

The loss caused by leaf-roll is due to the reduced number of tubers per hill and to their smaller size. Where the percentage of leaf-roll plants in a

crop is high the reduction in the tonnage per acre will be considerable, and in addition a large proportion of the tubers will not be of marketable size. It has been shown that leaf-roll hills yield 40-65 per cent. less in weight of tubers than healthy hills, and when, along with this is considered the fact that instances of infection as high as 75-85 per cent. are frequently met with in crops in this State, it will be seen that the losses from this disease may be very great. Coastal growers depend almost entirely on tableland growers for their seed, and most of them realise that on its quality depends in a large measure the success of their crops. Hunter River district early potato growers have, in the past, favoured a particular strain of Satisfaction seed from the Northern Tableland. At the present time, however, this

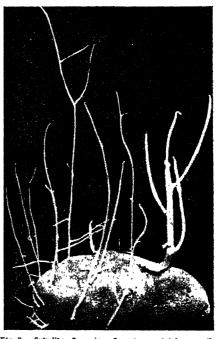


Fig. 3.—Spindling Sprouts, a Symptom which I requently Accompanies Leat-roll.

[After Heald.]

strain has deteriorated so much on account of leaf-roll that growers are looking elsewhere for seed. This is an instance where inattention to maintaining the quality of seed has resulted in the loss of a valuable market.

#### Mosaic.

Mosaic disease is so called on account of the mosaic-like pattern or mottling of the leaves of affected plants (Fig. 4). Mosaic, like leaf-roll, is caused by an infectious virus which is present in the sap of diseased plants.

Leaves of diseased plants show a mottled pattern of yellowish-green and dark-green areas on their upper surfaces, and as a rule, are somewhat puckered and wrinkled and more or less reduced in size. Several types of mosaic disease are recognised, e.g., rugose mosaic, crinkle mosaic, mild mosaic, &c., but from a practical viewpoint it suffices to regard these variable types as a single disease, although they affect the yield to different degrees.

The distinctness of the mosaic pattern is markedly influenced by the temperature conditions under which the crop is grown. It is very distinct under cool conditions, but at temperatures above 80 deg. Fah. the mosaic pattern begins to disappear. This effect of temperature on the symptoms of virus diseases is spoken of as "masking." On account of masking, mosaic is more frequently seen in tableland than in coastal crops.

Some types of mosaic cause considerable stunting and much malformation of the foliage, while others have only minor effects. These types vary also in their effects on yield, the most severe forms causing a reduction of 25 per cent. of the normal return. Tubers from diseased plants cannot be distinguished from healthy ones.

A yellow variegation or flecking is occasionally seen in potato foliage. This should not be confused with mosaic, as it apparently causes no damage and is quite general in some varietal strains.

Some varieties appear to be more susceptible to mosaic than others. The blue skins, Manhattan and Guyra Blue, frequently show considerable mosaic, and the same may be said of Early Manistee and Queen of the Valley. Factor is apparently much less susceptible to mosaic than it is to leaf-roll.

Mosaic is a much less important disease than leaf-roll in New South Walesalthough certain varieties may suffer severely from it. It resembles leaf-roll in that it is carried over from year to year in the seed pieces, and is spread under natural conditions by insects. The soil does not carry mosaic infection.

# Control by Seed Selection.

The control of potato virus diseases lies primarily in the selection of disease-free seed, since it is from the seed that infection originates each year. It is not sufficient to select seed in the barn, since leaf-roll and mosaic cannot be detected in the tubers. Further, a large percentage of the tubers derived from infected plants are of such a size that they could normally be selected as seed.

The idea is too prevalent among growers that any lot of potatoes of uniform type and small size will, of necessity, make good seed. It is common to grade a crop into "tables," "seed" and "pig." If it were not for the general prevalence of degeneration diseases, seed might well be selected on this basis of size, but at the present time this method cannot be too strongly condemned. It should be realised that under normal conditions in New South Wales, as in other parts of the world, all stock has a tendency to "run-out," and that to maintain quality special efforts have to be made. The aim should be to procure seed which is true to type, and as free as possible from virus and other diseases.

Selection of seed should be carried out in the field where the nature of the foliage may be used as a guide to what may be expected of the tubers selected.

The stating of outstanding healthy plants at flowering time, and the digging of such plants separately will yield a quality of seed much above the average.

All tubers from such plants, except the very small ones, should be used as

seed, cutting where necessary. This method, however, does not avoid secondary infection with leaf-roll, since many of the marked plants may already be infected, although symptoms of disease are not evident. Premature digging of selected plants before the tops die will tend to lessen current-season infection of tubers.

#### The Stud Seed Plot.

The maintenance by each grower of a small stud seed-plot of sufficient size to supply enough seed for his main crop and stud plot the following year, will help to solve the problem of procuring healthy seed. Special attention must

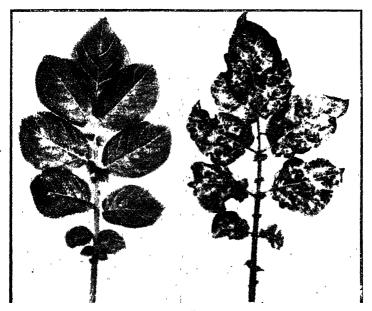


Fig 4.-Leaves from Healthy and Mosaic Plants.

[After Johnson.

be given to this plot which will occupy about one-tenth to one-twelfth of the total area under potatoes. It should be isolated as far as possible from other potato crops grown on the farm or neighbouring farms to reduce the chance of insect transmission of disease. The distances virus diseases may be carried vary under different conditions, but a distance of 75 to 100 yards should afford ample isolation.

The seed used in planting the seed-production plot should be of the best quality procurable, both in its freedom from disease and trueness to type. The planting of the stud plot with sets which are cut from table-size tubers is recommended, since such tubers are less likely to have come from leaf-roll plants, and in addition, cutting enables the detection of those fungous and bacterial diseases of which one symptom is the discoloration of the vascular

ring in the tuber. Many growers do not favour the practice of planting cut seed, contending that apart from the extra labour involved, losses are liable to occur from "misses" if the seed-bed is at all dry. This objection cannot be upheld since it has been shown that if the cut surfaces are dusted with ashes, lime or sulphur, and not allowed to sweat in bags, "misses" are not more liable to occur than with whole seed.

The seed for planting the seed plot should be greened and sprouted in a well-lighted shed, or in the open, to favour the development of hard, stubby shoots. Any tubers showing abnormal, "cottony," or spindly sprouts (Fig. 3) should be discarded. Seed, while sprouting should be examined for the presence of aphids which may be easily killed by spraying with nicotine solution.

"Rogueing" or the eradication of all diseased and off-type plants is the most important operation in the handling of a stud seed plot. The plot should be gone through very carefully at least three times—once when the plants are about 9 inches high, again at blossoming time, and later before the tops have begun to die off. Undesirable plants of all types should be removed, their tubers being carefully dug out. The last inspection is necessary to detect plants which are affected with fusarium wilt. The presence of virus diseases can best be detected at flowering time, although severely affected plants may be distinguished very early in the season.

Cultivation of the seed-production plot should be very thorough since weeds harbour aphids—the most important agents in transmission of virus diseases. It is preferable that the plot be located on good soil, since a high yield is desirable. All tubers from the stud plots, including table size, should be used as seed for the next season's crop.

It has been found that on account of the rate of natural spread, rogueing of a crop for virus diseases is rarely of value if the degree of infection is above 20 to 25 per cent. It is, therefore, imperative that seed of high quality be used in planting the stud plot.

# Summary.

- 1. Virus or degeneration diseases are very prevalent in the potato crops of this State. Infections with leaf-roll as high as 75 to 85 per cent. are of frequent occurrence.
- 2. Virus diseases are of importance since they lower the yield and increase the percentage of small tubers in a crop.
  - 3. The symptoms of leaf-roll and mosaic are described.
  - 4. Control of leaf-roll and mosaic is dependent upon the selection of disease-free seed.
  - 5. The maintenance of a stud seed plot, in which rogueing of diseased and undesirable plants is practised, is recommended as the best method of obtaining healthy seed.
- 6. The disadvantages of selection of seed in the barn, or at digging-time from the main crop, are pointed out.

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# Reaction of Wheat Varieties to Flag Smut.

J. T. PRIDHAM, H.D.A., Plant Breeder, and R. E. DWYER, B.Sc.Agr., Assistant Plant Breeder.

TESTS have been continued during the past season at Bathurst, Cowra, and Wagga Experiment Farms, with additional varieties of wheat to determine their relative resistance or susceptibility to flag smut. Although it is suspected, nothing is yet known as to whether physiologic forms of this disease occur here, and a mixed inoculum from the above farms has, therefore, been used in infecting the seed, which in the case of varieties has been of a common strain.

The highest percentage infection occurred again at Bathurst, though a good infection was obtained at Wagga. Only a moderate infection was secured at Cowra, and many wheats which were apparently immune or highly resistant there proved to be susceptible or highly susceptible at Bathurst or Wagga. There were also a few wheats which apparently escaped heavy infection at Bathurst, but which proved to be susceptible at Cowra or Wagga. The reaction of the variety is determined by the greatest degree of susceptibility in any location, and the varieties which have been tested so far in New South Wales are listed according to this reaction as follows:-

#### Immune-

Cedar. Dan. Dindiloa. Ghurka, Galgalos.

Red Rock.

Tuela. Zealand Blue.

## Highly Resistant—

Adage, A112, A115. Bunyip, Bomen, Bathurst 15. Camden, Clonel 4, Clonel 7,

Carrabin. Dargum, Dundee.

Exquisite.

Forel, Ford, Firwhill, Forge.

Goonoo, Geeralying, Genoa.

#### Resistant-

Aurora, Apollo. Baroota Wonder, Bathurst .7.

Comeback, Cargo. Dart's Imperial.

Firbank.

Mac's White. Queen Fan. Riverina. Sword.

Sindhi.

Kawvale. Lawson.

Nabawa.

Rymer.

Zaff.

Sunset, Salt, S.H.J.

Warchief, Wandilla\*, Webster.

<sup>\*</sup> Wandilla has been found on odd occasions to be badly affected by flag smut, but it is generally highly resistant under field conditions.

Moderately Resistant-

Abbott, Austral, Azure,

Australiano.

Baringa.

Cookapoi, Colo, Currawa.

Euston. Gullen. Hunter.

Improved Steinwedel.

Nolba.

Sands. Wardfir.

Zealand.

# Susceptible-

Auction, Argus, Austan, Astor, Arrow, Atlas, A113.

Binya, Bald Early, Bobin, Bogan, Boonoo, Bruce, Bunge, Barwang, Bena, Bredbo, Burrill, Barry, Bonshaw, Bobs.

Clarendon, Caliph, Canberra, Capeton, Carlton, Carinda, Confederation, Craboon, Canimbla, College Purple, Comara, Condong, Cowan, Crostan, Cleveland.

Duri, Droophead, Duchess, Dunmore.

Early Bird, Elfin.

Florence, Farley.

Gular, Garra, Girral, Gresley, Gidley, Gluford, Grahame.

Hard Federation.

Kenya Governor.

Linden.

Maharajah, Maclean, Major, Marshall's No. 3, Minister, Mogul.

Noongar, Newman's Early, Nizam, Nullah.

Omrah, Onas.

Pusa 100, Perfection.

Quality.

Rajah, Ranee, Reilly's, Richelle Hative, Rodite.

Silver Bart, Sovereign, Sultan, Stirling.

Thew, Turvey.

Union.

Watchman, Wagga 49, Waratah, Warren, Warden, Wagga 53, Wagga 55, Ward's Prolific, White Lammas.

Yandilla King, Yuna, Yilma.

# Highly Susceptible—

Akubra, Aussie, Avoca, A089.

Bowes, Bland, Bolton, Baden, Brevet, Burnham.

Cadia, Copeland, Clarke's, Coobang, Corona, Chilian, Curstein.

Dilga, Dookie Delta.

Federation, Free Gallipoli, Faun, Forelock, Felix.

Gluyas Early, Gloss, Guinea.

Inderet, Ilford.

Kerley's Wonder.

Morven, Malakos.

Numba.

Ogilvie.

Plowman's 210, Pusa 12, Penny, Purple Straw, Plowman's 212C.

Highly Susceptible—continued.

Sirdar, Straightboard, Satisfaction

Triumph.

Waugan.

Yetna.

As indicated in previous articles, it will be seen that most of the standard varieties of wheat grown in New South Wales are susceptible to flag smut. Although the disease appears to have made headway in recent years, it will be some time before the present popular varieties are given up because of their susceptibility. A number of promising new varieties also appear to be susceptible to the disease, but although these varieties may come to be grown there is little doubt that eventually the varieties produced by the plant-breeder must be highly resistant or resistant to flag smut, as well as productive, to become popular. The production of such wheats is, at any rate, a definite objective in the wheat-breeding work of the Department. Some new wheats can already be indicated as flag smut resistant, but not sufficient is yet known of their yielding capacity to recommend them.

It will be observed that among the most highly resistant, the only ones recommended by the Department are Firbank (for hay only), Nabawa and Wandilla. Other varieties in this class which are grown in New South Wales to some extent in certain districts are Bunyip, Bomen, Exquisite, Ford, Rymer, Baroota Wonder, Queen Fan and Riverina. The most promising new varieties in this class are Adage, Dundee, Dargum, Lawson, and Mac's White.

In addition to these, the following fixed crossbreds, which have not yet been named, have so far proved to be most highly resistant:—

Bomen x Red Russian.
Warden x Forge.
Galgalos x Bena.
Federation x Galgalos.
Yandilla King x Bomen.

The parent to which these crosses owe their resistance is readily seen, and a large number of unfixed crossbreds with at least one highly resistant parent are also being inoculated each year at the aforementioned farms, and apparently resistant plants are being selected with the object of evolving a resistant variety which is productive and well adapted to the district.

THERE is scarcely a branch of pure science which may not contribute some knowledge which agriculture can apply.

Top-dressed pastures not only give more feed, but they give better feed. Write to the Department of Agriculture for pamphlets.

# Potato Trials, 1929.

FARMERS' EXPERIMENT PLOTS ON LOWER NORTH COAST.

J. M. PITT, H.D.A., Senior Agricultural Instructor.

Due chiefly to the high price and scarcity of good seed the number of potato trials conducted in co-operation with farmers was limited last season. The following farmers had plots:—

J. G. Ward, Sherwood, Macleay River.
J. P. Mooney, Taree, Manning River.
E. A. Booth, Austral Eden, Macleay River.
Colin Shields, Mt. George, Manning River.
M. Smith, Paterson.

Also a small trial was conducted with Mr. L. E. Townsend, Bulga Plateau. The plots sown by Messrs. E. A. Booth and M. Smith were spoilt by the floods which took place in those districts shortly after sowing. The

remaining plots were good.

It will be noticed that the variety trials carried out for a period of over ten years have been superseded by "strain" trials. Farmers will find these experiments to be of the greatest importance. Whilst it has been proved conclusively that the white-skinned varieties, Factor and Up-to-date are the most suitable for the district, growers will now be able to ascertain the source of the most suitable seed supply. This has been made possible by the field competitions conducted each year in the important seed-producing districts of Crookwell, Batlow, Taralga and other places—the seed for coastal trials being obtained from the leading farmers in those districts.

At the present time most of the strains of seed potatoes introduced into coastal districts are not of the best, being mostly of "unknown" pedigree, possibly from a centre infested with eelworm, scab and other pests. Furthermore, in the majority of cases the strains are poor yielding, a fact borne out by observing the yields from crops grown side by side with the selected seed.

By a continuation of field contests and strain trials potato farmers will have a rare opportunity of being placed in touch with some of the State's best yielding and cleanest seed supplies, and whilst it may not yet be possible to secure all the seed required for coastal use from these centres, still the potato industry must receive a much needed uplift.

The names of the growers mentioned as supplying the strains of the varieties are as follows:—

Johns Bros., Myrtleville.
D. Wright, Taralga.
D. Harries, Bannister.
W. J. McPaul, Taralga.
C. Barberie, Batlow.
O. Frost, Bannister.
J. Howard, Taralga.
J. J. Cusack, Taralga.

#### The Season.

On the Macleay fairly dry conditions prevailed during the winter months and for a time after sowing, but especially during September and October, heavy rain was recorded, proving ample for the crops' needs. An attack of early blight, brought on by the cold unseasonable spring conditions, reduced the yield somewhat, but otherwise the plots were clean.

On the Manning a good average year prevailed, heavy rain being recorded in the spring months. Early blight was prevalent in the trial plots.

TURE TABLE	RAINE	ALL	Ta	ble.
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	3	fonth.	 1	Shrwood	Taree
July August September October November	•••		 	Points. 128 135 486 1,105 186	Points. 478 264 546 918 375

#### The Plots.

Sherwood.—Alluvial loamy soil; previous crop maize (fodder), cut in June, stalks harrowed and burnt. Ploughed July, left one month; rolled and disc harrowed; double disced across and drills opened 2 feet 9 inches apart; sets sown 14 inches apart on 14th August; fertiliser used P.B.3 at 1½ cwt. per acre; sets covered with Planet Junior; germination good. Johns' Up-to-date made most headway in the early stages. Crop worked twice with Planet Junior, hoed once and hilled later. Early blight attacked the crop in November; cold nights and unseasonably cold weather throughout. The crop was fairly good—about 15 per cent. smallish. Wright's and Harries' strains had a slight advantage over the other varieties.

Austral Eden.—Two floods in quick succession in October covered this plot, causing the plants to rot.

Dumaresque Island.—Rich alluvial soil, old cattle camp; deposit left by February flood. Ploughed three times; sets ploughed under 16th August in rows 2 feet 9 inches apart; no fertiliser. Good growth continued throughout. Early blight was present in November, killing the top growth and reducing the yield somewhat. Wright's and Harries' strains of Factor did best of this variety, but Johns' Up-to-date gave the best yield.

Mount George.—Alluvial soil, brought to a good tilth by ploughing (twice) and harrowing; previous crop maize. Plot sown 24th August in drills 3 feet apart, sets 15 inches apart; superphosphate 3 lb. to the chain. Germination good and crop continued well throughout. McPaul's Manistee yielded better than Cusack's although the latter appeared to make the best growth. Frost's Tasmanian Brownells yielded over 15 cwt. to the acre more than Howard's Satisfaction.

Bulga Plateau.—A small trial conducted on rich volcanic soil, well prepared. Drills 3 feet apart, sets 15 inches apart in rows; sown early September. McPaul's three rows were infested with scab, and also the row of Cusack's adjoining McPaul's sets, the remainder of Cusack's being free; this probably accounted for the latter giving the higher yield. Some of the tubers harvested were of excellent quality and size.

The yields were:-

			t.	c.	q.	
Cusack's Manistee	 •••	 	7	6	ī	
McPaul's Manistee	 •••	 	5	8	1	

Paterson.—A very disastrous flood completely ruined the bed.

YIELDS	of	Variety	and	Strain	Trials.
--------	----	---------	-----	--------	---------

Variety and Stra	in.	1	Duma	resq Is	sland.	Mour	ıt Geor	ge.	Sh	erwoo	ear b
Johns' Up-to-Date Wright's Factor Harries' Factor McPaul's Factor Barberie's Factor Frost's Tasmanian Bre Howard's Satisfaction McPaul's Early Manis Cusack's Early Manis	tee		tons 8 8 8 7 7	. cwt. 11 4 0 12 14	qr. 1 0 0 3 1		ewt. 6	qr.	tons. 6 7 7 6 6	. cwt. 15 2 0 1 15	'h o o o 1 2

# AUSTRALIAN IMPORTS OF CITRIC ACID.

In 1927-28 the Commonwealth imported approximately 3,000 cwt. of citric acid, valued at £30,000.

WINTER SCHOOL FOR FARMERS, POULTRY FARMERS, ETC., 1930.

THE usual Winter Schools are to be held at the Hawkesbury Agricultural College, Richmond, from the 1st to 18th July, 1930, the duration of the various courses of instruction and the fees charged being as follows:—

		1	ee.		
		£	s.	d.	
1st to 18th July-Mixed Farming (Wheat and Sheep)	***	3	10	0	
lst to 18th July—Poultry Farming		3	10	0	
8th to 18th July—Dairy Farming (Cattle and Pios)			5	-	
8th to 18th July-Horticulture (Orcharding, Vegetable	Gar-	_	•	•	
dening, Bee-keeping)		9	ĸ	Λ	
	•••	~	v	v	

The fees charged for each Course include board and lodging, tuition, and medical attention.

A syllabus and any other information required can be obtained from the Under Secretary, Department of Agriculture, Box 364, G.P.O., Sydney.

A summary of the results and observations of unsupervised trials indicates that when very early plantings are made the selections are not as early as Canadian Wonder in producing the first full pods, but even under these conditions the bulk of the beans on Tweed Wonder are fit for picking much earlier than Canadian Wonder. Later plantings appear to favour the early maturing of Tweed Wonder; the difference in producing the earliest pods is small, while in all cases Tweed Wonders provided the bulk of early beans.

Other trials are being conducted on later crops, and judging by present indications and last year's results, Tweed Wonder should be earlier maturing in the late crop than Canadian Wonder. That Tweed Wonder is a heavy yielder can be judged by the fact that Mr. Roy Wallent, of Wamberal, marketed about 320 bushels from an area well under an acre, and yet there were still plenty of pods left on the bushes.

#### Manurial Trial with Tweed Wonder.

Mr. Roy Wallent co-operated with the Department of Agriculture in conducting a manurial trial on the early bean crop. The object of the experiment was to ascertain which fertiliser or combination of fertilisers would give the best results with this crop. Tweed Wonder was the variety used in the trial. They were planted on 8th July in soil that had previously grown cucumbers, and which had been fallowed under good conditions. The season throughout was a late one, that is, the spring was late, many cold nights being experienced right up to Christmas. This is not ideal bean-growing weather, the soil under such conditions being cold and lifeless

The first beans were pulled on 15th October, the plot manured with superphosphate producing a slightly heavier yield than the rest of the plots. At the second pulling the two basic superphosphate plots produced the heaviest yields, while at the end of November the totals were in favour of the complete manure (P 13), with the light dressing of basic superphosphate second, and P11 third. The complete results pointed to P11 being the most suitable fertiliser mixture for the year, thus demonstrating that additional nitrogen is distinctly advantageous in a cold season such as that experienced. Superphosphate alone, which has always given good results with beans, produced the second highest yield. P13 is the same fertiliser as P11 with the addition of sulphate of potash, and the only conclusion that can be drawn from the fact that the P13 plot produced less than the P11 plot is that the addition of potash is not an advantage. Previous experience supports this contention. The cold spring did not favour M22 fertiliser mixture, which contains 50 per cent. bonedust. Basic superphosphate. which has always given excellent results, is either unsuitable for this particular locality or last season was unfavourable to its use. Doubling the application of basic superphosphate produced a definite decrease in yield. as experienced in previous years.

These trials will have to be continued before definite conclusions can be strived at.

RESULTS of Tweed Wonder Manurial Trial.

	P1: (327 ) per acre	b.	Supe phosph (2½ cv per acre	ate vt.	P1: 374 l per acre	b.	M2 (2½ c per acre	wt.	Bas Sup phosp (2½ c per a	er- hate wt.	Bas Sup phosp (5 c pe acro	er- hate wt.
are and distributionally described to the property of the control	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
Pickings up to 27-10-29	 10	11	9	16	10	20	9	12	10	14	10	5
Total pickings (18-11-29)	 31	5	31	3	29	7	24	3	23	16	22	8
			1		ĺ							

Note.—Each plot measured one-tenth of an acre. P11 mixture consists of 6 parts superphosphate, 1 part sulphate of ammonia: P13 consists of 6 parts superphosphate, 1 part sulphate of potash, and 1 part sulphate of ammonia: M22 consists of 1 part bonedust, and 1 part superphosphate.

# Manurial Trial on Far North Coast.

#### M. J. E. SQUIRE, H.D.A., Agricultural Instructor.

A manurial trial was carried out last year on Mr. A. Wilson's farm, at Terranora, Tweed River. The variety used was Canadian Wonder.

The trial was planted on 24th April, 1929, germination and early growth being good. The manured plots were soon outstanding in growth, particularly those treated with M22 fertiliser mixture and the superphosphate and sulphate of ammonia mixture.

Rainfall during the growing period was as follows:—May, 656 points; June, 1,066 points; July, 78 points; total, 1,800 points. Unfavourable weather conditions after the end of June, and an outbreak of bacterial blight were responsible for very poor yields, which, however, are comparable. Harvesting commenced on 8th July, 1929, and each subsequent picking was a week later than the previous one.

YIELDS in the Manurial Trial, Far North Coast.

Fertiliser.	Quantity	1st	2nd	3rd	4th	Total.
	per acre.	Picking.	Picking.	Picking.	Picking.	Pickings;
M22 mixture  Superphosphate (6½ parts) and sulphate of ammonia (1 part).  Superphosphate  Basic superphosphate  No manure	3 ,,	bus. lb. 27 18 27 18 27 18 18 4 18 4 9 6	bus. lb. 23 4 23 4 11 13 11 13 Nil.	bus. 1b. 18 4 18 4 9 6 9 6 Nil.	bus. 1b. 9 6 9 6 2 7 2 7 Nil.	bus. lb. 78 10 78 10 41 8 41 8 9 6

NOTE - MEE fertiliser mixture consists of equal parts bonedust and superphosphate.

# Lessons of the Past Season.

Paper Read at the Grenfell Agricultural Bureau Conference, 1930.

W. D. KERLE, H.D.A., Senior Agricultural Instructor.

THE season just passed through has been the most trying ever experienced by both farmers and stock-owners in the central-western district of the State. This was primarily due to the low rainfall recorded since July, 1928, and other climatic factors, particularly the heavy frosts during last winter, and the late frost in October, which seriously affected the yield of wheat in some portions of the district. The outstanding feature of the season was the comparatively high average yield obtained throughout the district by wheat growers under such extremely adverse conditions. This is in such contrast with the disastrous crop failure in the years of 1902 and 1919, that it can only be attributed to the improved methods adopted by farmers, combined with the inherent drought resistance of new varieties.

In every season there are to be seen crops which are much above the average, and it is from these that much valuable data can be secured, particularly in a season such as the last. Experiment plots also provide an excellent opportunity of comparing, inter alia, the merits of new varieties with the standard wheats in the district, and particularly interesting last season was the comparison between some early maturing varieties and the standard Waratah.

As far as the wheat grower is concerned, the chief lessons to be learnt from the past season may be summarised as follow:—(1) The advantage of early fallowing and the influence that consolidation of the subsoil has on yield; (2) the inherent disease resistance of wheat varieties and the importance of sowing varieties with a view to diminishing the disease factor; (3) the drought resistance of varieties and the advisability of sowing them more largely in the dryer sections of the district; (4) the danger of over-stocking and the need of fodder reserves for drought periods; (5) the necessity of including more oats in the farm rotation and of establishing areas of grazing lucerne on wheat farms.

# Fallow Early and Well.

With regard to the fallow, it is significant that the six winning blocks in the eight competitions in the central-west were first ploughed in July or early August, and the weight of evidence every season is strongly in favour of those months being the most satisfactory in every way. The winter rainfall is invariably sufficient to allow ploughing to be proceeded with at this time, whereas the spring rainfall is most unreliable, and delay

might result in the ground being turned over in bad condition. The importance of doing the initial ploughing early and thoroughly, and when the soil is in the right condition, is not sufficiently realised, but it is definitely associated with high yields. This is largely due to the fact that it enables more moisture to be stored in the subsoil, provides better conditions for weed growth which can subsequently be destroyed, allows the soil to be compacted and mulched more easily and evenly, and increases fertility by stimulating bacterial activity and the production of nitrates. All these factors bear a distinct relation to high yields, and are within the control of the farmer. While long summer fallow has given good results in some sections of the State, it is not economical on the mixed farms in the central-western district, where land values are high, and the provision of feed for sheep is an important item.

Much of the reduction in yield last season was due to lack of consolidation in the fallow. This was primarily due to lack of rain in the summer, which is the chief agent in soil consolidation. It is such an important factor in wheat growing that it would seem advisable to endeavour to compact the soil with implements such as the roller. Several instances were noticed last season where the roller was used following the February rain to bring about consolidation. This proved very satisfactory, ensuring a good germination and apparently having a beneficial effect on yields. The roller (with light harrows behind) was also used with advantage after sowing in some localities, and it seems that its use, particularly on light soils, could be more generally adopted in seasons like the last.

Farmers for the most part more generally recognised the requirements of a good fallow. There is no standardised method that can be adopted to bring about these conditions in all soils, and wheat growers should familiarise themselves with the desired condition of the fallow at certain times of the season and use any means in their power, whether orthodox or not, to bring about the desired result.

#### Prevalence of Flag Smut.

In the past season the main factors with which wheat growers had to contend were the lack of rain and the prevalence of flag smut. It is interesting therefore to compare the yields obtained in farmers' experiment plots from the point of view of resistance to these factors. Although the reduction in yield of some varieties has been generally attributed to their inability to stand up to dry conditions, it is evident that in some cases this was due, not so much to that, as to their susceptibility to flag smut. Take for example Waratah, which hitherto was regarded as drought resistant, and undoubtedly has given ample evidence of such in past seasons, but which was last season considerably below other varieties in yield. This could be traced in most cases to a heavy infestation of flag smut, to which disease it is unfortunately susceptible.

This was also true of Federation and several varieties with Federation parentage, chiefly Union. On the other hand it is very probable that the success of Nabawa was due to its immunity to flag smut rather than to any inherent resistance to drought. This can also be said of Rajah, which came considerably to the fore last season and showed quite a degree of flag smut resistance.

As an example of resistance to drought we have an outstanding example in Bobin which, although highly suspectible to flag smut, outyielded all varieties in the majority of centres.

These varieties were the most prominent of early wheats in all centres, and each has its particular merits.

It is, unfortunately, becoming more essential each year that farmers must take all possible steps to eliminate flag smut. This is by far the worst disease with which growers have to contend, and no stone should be left unturned to prevent its spread. Probably the best means to that end at present is the sowing of varieties which are resistant, and paddocks known to have been attacked should be sown with Nabawa for some years in an endeavour to starve out the disease. It must be remembered, however, that other measures for its prevention must be practised at the same time, such as feeding only oaten chaff or chaff from disease-free wheat to horses.

#### The Question of Varieties.

The practice which many wheat growers have of judging the performance of varieties by their behaviour in one season cannot be too strongly condemned, particularly when their judgment is based on a season such as the last. This generally results in changing varieties almost annually and in having far too many varieties on the farm. An example of this is the big demand for Nabawa, due to its prominence in field wheat competitions, &c. It is quite possible that confidence in it to "deliver the goods" will be justified, but there is room for doubt as to whether in normal seasons it will yield up to the erstwhile favourite Waratah.

In those districts farther west where the annual rainfall is normally lower than at, say, Cowra, varieties should be selected for sowing with more regard to their drought resistance. Varieties which depend particularly on good "finishing rains" to give high yields are too frequently sown, the lack of rain at this critical period resulting in pinched grain and low acre yields. Bobin is worthy of extended trial in these districts in comparison with Nabawa and Waratah.

It is not my intention to review the many excellent wheat varieties under observation in this district, but rather to draw attention to the fact that the idiosyncrasies of varieties are not manifested in one season, and wholesale sowing of new varieties which have not been tested over a number of seasons should be avoided, but when it is definitely established that any variety has merits in any important direction, such as Nabawa in the control of flag smut, &c., the fullest advantage should be taken of it.

#### Sheep and Wheat.

Probably the most distressing feature of the season has been the difficulty of providing sheep feed. Sheep have been at starvation point for months and at their present value it does not pay to buy feed. There is no doubt that on the wheat farm sheep are invaluable, but it is difficult to estimate what is the safe carrying capacity owing to the erratic nature of the seasons, particularly as regards summer rains. It is certain that the number of sheep necessary to keep down weed growth, such as stink grass, in a summer of good rainfall would be well above the safe carrying capacity of the farm. It is very apparent that sheep are kept on the average mixed farm at present in a very haphazard manner, and are regarded as a blessing when weed growth has got beyond control and a curse when grass is scarce and weed growth negligible.

As sheep are a necessary adjunct to wheat growing, and a considerable source of revenue they should be given equal consideration to the wheat, and the farm practices arranged accordingly. The lack of method usually results in the wheat being sacrificed for the sheep, many examples of which were seen last season when wheat was fed off right into August without a hope of recovering. Incidentally it was most conspicuous that the outstanding crops of last season were not fed off at all. Where no feed is grown and no fodder conserved, the carrying capacity is much more limited than is generally realised. With the provision of feed the capacity can of course be considerably increased. The object should be to maintain a reasonably constant number of sheep with the object of having a regular consignment of fat lambs to market each year. This can only be done by the provision of suitable feed.

The establishment of grazing lucerne for spring, summer, and early autumn, and the growing of oats for late autumn, winter, and early spring constitute a ready means of providing continuous feed for sheep. While this would mean cutting down the wheat area it would result in better treatment of the wheat and a higher yield per acre, while the rotation of crops would considerably minimise disease and weed growth and assist in maintaining the soil's fertility. Grazing lucerne can be established very satisfactorily on the wheat lands of the central-west, and an endeavour should be made to have at least 50 acres on the average wheat farm. It should be sown at the rate of 4 to 6 lb. per acre (according to the quality of the seed) in the autumn on well prepared fallow. The duration of the stand will be determined very largely by the care and attention given, but it may be expected to be profitable for at least seven years.

#### Value of Grazing Lucerne.

The chief advantages of having an established area of grazing lucerne are (1) the amount of green feed it provides at the critical periods of the year, particularly for lambing ewes for topping lambs for market, or when grass-seed is troublesome; and (2) the possibility in good seasons of providing stacks of lucerne hay (which mice will not damage) for feeding in times of scarcity.

The value of lucerne was very evident last season, its response to the lightest falls of rain being most noticeable, and it provided feed when pastures were bare. It must be conceded that 50 to 100 acres of lucerne would greatly increase the carrying capacity and considerably improve the value of the property.

The problem of soil erosion is an acute one on the undulating wheat lands of the central-western district, and the most satisfactory crop to grow to prevent this is lucerne once it is established.

Grazing lucerne is the most economical means of providing continuous green feed throughout the spring and summer months, particularly where proper subdivision of the paddocks and cultivation and fertilising of the stand are carried out.

#### Grow Oats for Stock Feed.

With regard to oats, there is no known crop at present which will provide the same bulk of late autumn, winter and early spring feed as the early maturing varieties of oats, such as Mulga, Gidgee, &c., sown in March. Green feed is available usually from May until lucerne is available in spring. It may then be allowed to mature grain for storing in galvanised iron bins to be held primarily for stock feed, or if not so required for bagging and sale prior to the next harvest, when prices are usually so much higher that they more than compensate for cost of storage. After grazing the stock may be taken off in time to make a crop of hay also, which, if cut at the right stage, will provide one of the most valuable fodders for drought time, particularly if pressed.

In the more favoured sections of the district where it has been found that a long fallow is not so essential, sowing oats on the stubble in March and grazing to the ground by the end of September, then ploughing immediately for wheat for the following year, has been proved to be a very payable proposition. It is not advisable, however, in the drier sections of the districts, where a rotation of wheat, oats, and fallow is preferable.

The history of wheat growing in this State shows that it is inevitably associated with intermittent periods of drought. These periods should be provided for by the stock-owner both from a business and a humanitarian point of view, and the ways of doing so are well within the means of most mixed farmers. A ration of 1½ lb. of lucerne hay and 4 oz. of oaten grain per day has been proved capable of maintaining sheep in good condition in drought times. Both these feeds can be grown and stored economically and provide the best insurance against drought.

It is becoming increasingly evident each year that every revenue producing section of the mixed farm must be developed to its fullest extent, that they are so intermingled one with another that a definite system of crop rotation and fodder conservation must be adopted to combat, as far as is humanely possible, the ravages of the two greatest bugbears of the farmer—disease and drought.

### Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36a, G.P.O., Sydney. not later than the 12th of the month.

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Wheet_
  Bald Early ...
                            ... \lanager, Experiment Farm, Trangie.
  Clarendon ...
                            ... C. F. T. Anderson, "Swan Vale," via Glen Innes.
  Cleveland ...
                            ... W. Burns, "Goongirwarrie," Carcoar.
  Federation ...
                            ... W. A. Glenn, Thyra Road, Moama.
  Hard Federation
                            ... Manager, Experiment Farm, Trangie.
  Marshall's No. 3
                            ... G. W. Forsyth, "Glencoe," Wallendbeen.
                               F. Bauer, Bribbaree,
  Nabawa
                            ... A. D. Dunkley, "Bon Lea," Tyagong, via Grenfell.
  Nizam
                            ... A. D. Dunkley, "Bon Lea," Tyagong, via Grenfell.
  Queen Fan ...
                            ... C. F. T. Anderson, "Swan Vale," via Glen Innes.
  Turvey
                            ... F. Odewahn, Culcairn.
  Union
                            ... E. H. K. King, "Karrindee," Uranquinty.
  Wandilla
                            ... H. J. Harvey, "Kindalin," Dubbo.
  Waratah
                            ... Manager, Experiment Farm, Trangie.
E. H. K. King, "Karrindee," Uranquinty.
                               C. F. T. Anderson, "Swan Vale," Glen Innes.
Oats-
  Algerian
                            ... C. Bennett, "Theole," Forbes Road, Cowra.
Maize-
  Large Goldmine ...
                            ... P. Short, "Moore Park," Armidale.
Onions-
  Improved Hunter River
  Brown Spanish ... S. Redgrove, "Sandhills," Branxton.
Early Hunter River White S. Redgrove, "Sandhills," Branxton.
  Hunter
                       Brown
            River
      Spanish
                            ... C. J. Roweliffe, Old Dubbo Road, Dubbo.
Watermelon....
  Angelino
                           ... C. J. Roweliffe, Old Dubbo Road, Dubbo.
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A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

## The Australian Bush Nut.

(Macadamia ternifolia, spp.)

AN EDIBLE NUT WITH COMMERCIAL POSSIBILITIES.

H. W. EASTWOOD, H.D.A., Fruit Instructor.

Although the Australian Bush Nut is indigenous to northern New South Wales and Queensland, the local interest taken in it is not in keeping with its great commercial possibilities. Its value and importance, however, are slowly gaining recognition on the North Coast, where a few commercial areas have been planted in recent years, but most plantings are for ornamental purposes. Other countries into which it has been introduced have realised its full worth.

Besides producing a very nutritious food nut, which compares very favourably with any other edible nut, it grows into a very symmetrical tree, useful for providing shade and shelter, and for beautifying the farm landscape.

#### Suggested Lines of Improvement.

The nuts ripen during March, which is an opportune time to select seed for raising young trees. Selection is one means of securing desirable characteristics in the nuts, and of eliminating undesirable ones. There is a big variation in the nuts, foliage and habits of the growth of this tree. Some of the disadvantages existing at present are that the trees produce prickles or spines on the margin of leaves, they bear double, single, or half nuts having a hemispherical shape, there is variation in the quality of the meat of the nuts, and some nuts crack or open prematurely, but the chief faults are the thickness of the shell and roughness of its surface, which factors make the nuts very difficult to open even with crackers. A typical thin-shelled nut is what is required, the larger the better. Unfortunately the very thin-shelled nut has a tendency to run small and is usually undersized.

Seed for propagating should only be selected from trees which have shown desirable characteristics, such as vigorous and thrifty growth, regular and heavy bearing habits, the production of well-filled and uniformly-shaped nuts, freedom from disease, thinness of shell, and earliness in reaching the stage of commercial bearing.

#### Plant in Autumn or Spring.

When the nuts have been selected they should be planted while still fresh, and the sooner they are planted after reaching full maturity the better. This will ensure good germination, for as these nuts do not maintain their vitality for long periods, the percentage of germination decreases in proportion to the length of time between full maturity and planting.

Autumn planting—March to May—with new season's seed will give a better germination, the nuts will strike more quickly and a better root system is likely to develop. The seed should be planted in properly prepared seed beds in which is incorporated a big percentage of sand, or in pots, preferably the latter, and require covering to a depth of 1 to 2 inches with soil or leaf mould, which is much better, if procurable. The soil should be kept moist by periodical waterings and shading if necessary.

If the nuts are kept for spring planting they should be placed in moist sand—stratified—after harvesting and should be kept at a low temperature and in a dark place until required.

#### Methods of Propagation.

Although there are individual instances where the thin-shelled nut has reproduced true to seed, the general experience with seedling fruit and nut trees is that they do not come true to type, and this method cannot be relied upon. Moreover, it is a slow method of reproduction. The only sure way of reproducing the desired characteristics of the parent tree in the offspring is by vegetative propagation, and it would appear that this method will have to be practised before the growing of Macadamia nuts can be established on commercial lines.

Vegetative propagation of this nut tree has so far not received much attention and although they may prove more difficult to raise in this way than other fruit trees, it is considered that skilled nurserymen would not be seriously troubled in budding or grafting these trees, and under favourable conditions the percentage of "takes" should make it a profitable undertaking. Some experimenting with the different methods of budding and grafting would be necessary before the most successful method was discovered, and perhaps patch budding and side tongue and whip grafting of year-old seedling trees could be used as a basis for trial.

#### NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.

THE Co-operative Bud Selection Society, Ltd., supplied the following selected Valencia Late orange buds to nurserymen during the 1929 budding season, trees from which should be available for planting during this present year:—

T. Adamson, Ermington	•••	***	***	***	Buds. 3.100
T. Eyles, Rydalmere F. Ferguson and Son, Hursty	211.	•••	***	***	3,500
K. Hughes, Ermington	1110	•••	***	***	1,500 1.000
G. McKee, Ermington	. ***			•••	3,000
L. P. Rosen and Son, Carling Swane Bros., Ermington	ford	(late of	Epping)	•••	11,400

<sup>-</sup>C. G. SAVAGE, Director of Fruit Culture.

## Farm Forestry.

## V. THE NATIVE AND INTRODUCED TREES OF NEW SOUTH WALES.

[Continued from page 233.]

R. H. ANDERSON, B.Sc.Agr., Assistant Botanist, Botanic Gardens, Sydney, and Lecturer in Forestry, University of Sydney.

#### THE COASTAL DIVISION—continued.

#### Native Trees of the Coastal Division—continued.

GREY GUMS AND SPOTTED GUMS.

THE bark of these is very characteristic, being patchy and rougher than the usual smooth bark of the gums. Patches of the outer bark fall off, exposing the smooth white surface, which in turn becomes grey. The several species form a characteristic part of the coastal flora.

#### GREY GUM (Eucalyptus punctata).

A small to medium-sized tree found in all Coastal subdivisions and ascending the eastern slopes of the Tablelands. It is practically confined to poor soils, including those from hungry sandstone areas, but, like many eucalypts, makes its best development when the subsoil is of clay. The bark is dull grey and patchy, and the flowers rather large and handsome. It is occasionally known as Slaty Gum or Leather-jacket, the latter name being also applied to several other trees.

Uses.—The species is a good hardwood timber tree for poorer soils. The reddish timber is strong and durable, possessing many of the features of Ironbark, although not of such excellence. Logs sometimes contain a good deal of gum veining, which reduce their value for milling. The timber is generally regarded as durable for fencing posts.

A closely related species, *Eucalyptus Shiressii*, is found in the central subdivision on poor sandstone soils in the Hornsby-Hawkesbury district. It is a small to medium-sized tree closely resembling the Grey Gum, differing in the narrower juvenile leaves and somewhat smaller fruits. The blotchy colouring of the bark at certain seasons is quite ornamental. The red, often gum-veined, timber is probably similar in usefulness to that of the Grey Gum.

Another closely related Grey Gum is *Eucalyptus adjuncta*, which so far has only been found in the Wyee district in the central subdivision.

The Large-fruited Grey Gum (Eucalyptus canaliculata) also resembles Eucalyptus punctata, but has larger fruits and buds and rather paler coloured timber. It occurs as a medium to fairly large sized tree, mainly on hills of the southern portion of the northern subdivision, often in company with such species as Grey Ironbark, Sydney Blue Gum or Small-fruited Grey Gum.

SMALL-FRUITED GREY GUM (Eucalyptus propinqua).

A tall, straight-growing species found north of the Hawkesbury River, being most abundant in the northern subdivision. Although it occurs on fairly poor sandy country, it prefers better soil to the Grey Gum (*Eucalyptus punctata*) and is mainly a tree of fairly moist, moderately good soils.

Uses.—The reddish timber is durable and strong, being used for most purposes requiring these features. Gum-veined logs prejudice its use a little for milling, but it is recommended for wood blocks, sleepers, &c., and is of good repute for fencing posts.

SPOTTED GUM (Eucalyptus maculata).

A medium-to large-sized tree found in all the subdivisions. It is a common tree of the southern coast, forming almost pure forests in parts, particularly on soils from the Silurian shales and slates. It is a species which is found on a wide range of soils, but appears to prefer sandy shale country, and, generally speaking, is a species of moderately poor soil. It is rare in the Sydney district, except for one or two patches in the Newport district, and appears to avoid the Hawkesbury sandstone. In the northern subdivision it ascends the slopes of the Tablelands to between 2,000 to 3,000 feet.

Uses.—The timber is used fairly extensively for general hardwood purposes, being comparatively light and easily worked. It is frequently used for making tool handles and for waggon building, and is a good bending timber. It is used for fence rails, but is not regarded as durable in the ground, although timber from South African plantations is said to be so in that country. Many of the logs, particularly from immature trees, have a large width of sapwood which decays rapidly and should be removed. The wavy grain makes selected pieces particularly attractive for carriage panels, &c. It is a fast growing species of some ornamental value.

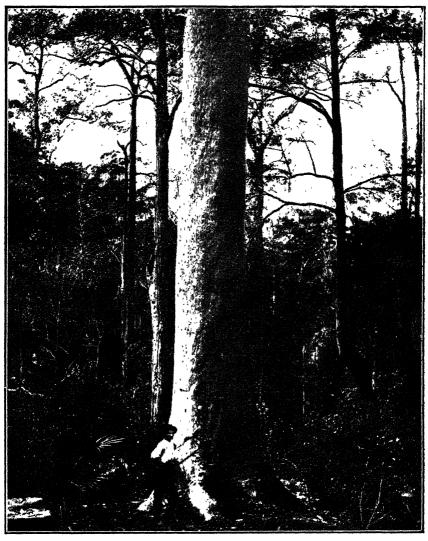
#### IRONBARKS.

The several species of ironbark, although not strong numerically, constitute an important part of the coastal flora and provide some of the strongest and most durable timbers in the world. They also form ornamental and useful shelter trees, particularly the Grey Ironbark (Eucalyptus paniculata) and the Pink-flowering Ironbark (Eucalyptus sideroxylon). They are usually slow-growing species.

GREY OR WHITE IRONBARK (Eucalyptus paniculata).

This species occurs in all the coastal subdivisions, being abundant on slopes and ridges, but reaches its best development in the moister valleys. It is, however, found on ironstone ridges in moderately poor soil, avoiding only the poor sandstone areas.

Uses.—The rather pale-coloured timber deepens with age, and is one of the finest timbers for any purpose requiring strength and durability, being particularly suited for heavy constructional work, sleepers and bridges. It is durable in the ground, but not very resistant to white ants. It forms a



Spotted Gum (Eucalyptus maculata).

nice ornamental tree, and when grown in clumps and lopped makes very useful shelter.

Broad-leaved Ironbark (Eucalyptus siderophloia).

This species is also fairly commonly known as Red Ironbark. It is a medium-to large-sized tree with a bark not so furrowed or rugged as other ironbarks, and is found in the central and northern subdivisions from Clyder Mountain north along the coastal ranges to Queensland, mainly in fairly dry, rather poor, clayey or silt soils, although also extending to moister, better soils.

Narrow-leaf Ironbark (Eucalyptus crebra), which is more fully described in the Agricultural Gazette, 1928, p. 839, is found fairly widely distributed in the drier parts of the Coastal Division from Nowra northwards. It is also known as Red Ironbark and furnishes a deep red timber little inferior to the best Grey Ironbark.

Mugga or Pink-flowering Ironbark (Eucalyptus sideroxylon) (see Agricultural Gazette, 1928, p. 840, for fuller particulars) occurs on fairly poor clayey soil or on rocky ridges in the central and southern subdivisions. It is one of the several ironbarks known as Red Ironbark, but is probably the least valuable of the ironbark timbers, although furnishing strong, hard and durable timber. The red-flowering form is ornamental, the dark, almost black, furrowed bark being also conspicuous. It is fairly hardy, both to frost and low rainfall conditions, but is slow growing.

Another ironbark with a very limited distribution is *Eucalyptus Beyeri*. This species has affinities with both the Grey and Narrow-leaved Ironbark, and is found in the dry districts, such as St. Mary's and Kingswood, to the west of Sydney. It is a tall tree with a rather sparse head, and furnishes a dark-chocolate coloured timber which is heavy, hard and durable.

#### STRINGYBARKS.

In this group are included not only the true stringybarks, but also several species, the bark of which closely resembles the stringybarks, although rather shorter in the fibre and at times inclined to be flaky. Such species are White Mahogany (Eucalyptus acmenioides), Red Mahogany (Eucalyptus resinifera), and the allied species Eucalyptus umbra and Eucalyptus notabilis. Most of the group supply good timber, which is fissile, moderately heavy, strong and durable.

#### Brown Stringybark (Eucalyptus capitellata).

A small to medium-sized tree found on poor sandy country from Sutherland in the central subdivision to Port Stephens in the northern subdivision. It is not uncommon in the sandstone areas in the neighbourhood of Sydney, and is also sometimes known as Red or Broad-leaved Stringybark.

Uses.—The timber is brown or reddish-brown, drying to a paler colour. It is strong, durable, splits readily and is suitable for posts, rails, building material and fuel.



Nerrow-leaf Ironbark (Eucalyptus crebra).

Encalyptus Camfieldii resembles in many respects a dwarf form of the Brown Stringybark. It occurs as a shrub or small tree on exposed sandstone soils in the Broken Bay and George's River districts. Another closely related mallee-like stringybark is Eucalyptus pygmaea, which is similar to Eucalyptus Camfieldii, but differing in the sucker leaves. It is found only on a gravelly sandstone plateau near Kuring-gai in the central subdivision.

#### Yellow Stringybark (Eucalyptus Muelleriana).

A medium- to large-sized straight-stemmed tree tound mainly in the southern portion of the southern subdivision on moderately deep and fertile soils in broken country, but avoiding exposed situations. The vernacular name is derived from the yellowness of the inner bark, which varies from a typical stringybark to a more compact, less fibrous one. The timber is also yellowish in colour.

Uses.—The timber is strong, durable, fissile and useful for general building purposes and fencing. It stands well in salt water, being used for harbour works in Victoria.

The White Stringybark (Eucalyptus eugenioides) (see Agricultural Gazette-1929, p. 779) is found throughout the Coastal Division, being a widely distributed and generally useful tree.

Eucalyptus nigra, a species closely related to the White Stringybark. occurs as a tall tree, frequently with dark-coloured bark, in a few localities in the northern subdivision, mainly in the Richmond River district. It has also been recorded for the Sydney district, and one authority gives it as reaching good size and form on the eastern edge of the New England Tableland.

The Blue-leaved Stringybark (*Eucalyptus agglomerata*) which is more fully described in the *Agricultural Gazette*, 1929, p. 779, is found in a few localities n both the central and southern subdivisions, mainly in hilly country.

Eucalyptus globoidea, a closely related species, occurs as a small to mediumsized tree in the southern and central subdivisions, ascending to the Tablelands. The pale, almost white, timber is generally useful.

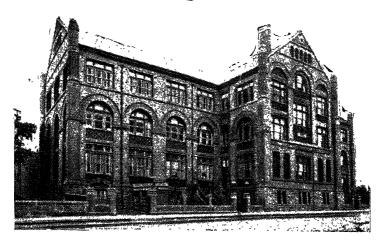
Another closely related stringybark, *Eucalyptus Tindalae*, is so far limited in its distribution to the Clarence River district. It is a slender-growing species resembling the Blue-leaved Stringybark in general appearance.

#### RED MAHOGANY (Eucalyptus resinifera).

A medium- to large-sized tree found in the central and northern subdivisions, mainly from Sydney northwards. It occurs on a fairly wide range of soils, and is common on rather poor gravelly ridges, appearing to avoid only the poorer class of sandstone soils. The bark is intermediate between that of a true stringybark and peppermint, but is more fibrous than flaky.

Uses.—The rich red timber is straight grained, durable and moderately heavy, and is used for general building purposes, flooring, weatherboards and shingles. It is a good substitute for Jarrah and selected pieces make nice furniture, although rather too hard and heavy for most cabinet purposes.

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Although said to be durable in the ground, there is some evidence against this, and it is sometimes used only for rails in fencing. The heavy, rather dark foliage of well-grown trees is fairly ornamental.

A closely related species, *Eucalyptus notabilis*, differs chiefly in possessing a much paler-coloured timber. Although so far recorded only from the lower slopes of the Blue Mountains, its range is probably more extensive, many people mistaking it for the Red Mahogany.

#### WHITE MAHOGANY (Eucalyptus acmenioides).

A medium-to large-sized tree found in the central and northern subdivisions from Sydney northwards in fairly moist and moderately good soils or on the edge of "brushes," but also occurring on well-drained, rather poor and dry soil on hillsides. The bark of younger trees is semi-stringy in appearance, but in older trees it becomes more flaky.

Uses.—The pale-coloured timber is strong, durable and generally useful, although sometimes difficult to saw. It is used for sleepers, and for poles and posts, and somewhat resembles Tallow Wood, although not so greasy and harder to work.

Eucaluptus umbra is a closely related species of the White Mahogany, and is found mainly in the Sydney-Broken Bay districts, and one or two other ocalities in the north. It has no particular usefulness, the wood probably having much the same features as that of the White Mahogany.

#### HALF BARKS.

In this group are included all eucalypts in which rough bark covers most of the trunk and in some cases extends to the larger branches. The remainder of the tree is smooth-barked. Included in this group are the various species known as peppermints, boxes and black-butt. In some cases, such as Eucalyptus quadrangulata, Eucalyptus Baueriana and Eucalyptus angophoroides, the rough bark extends to the smaller branches, and these species might, therefore, be included in the rough bark group. They are, however, most commonly classified with the boxes, and are consequently retained with their fellows in the half barks.

#### WHITE OR GREY BOX (Eucalyptus hemiphloia).

A medium to fairly large sized tree found on rather heavy soils in the drier parts of the central and northern subdivisions, as well as a few localities in the south. It is most common on rather low-lying country which periodically becomes more or less waterlogged.

Uses.—The pale-coloured timber is very strong and durable and is not readily split. It is used for posts and sleepers, and is considered to be an excellent fuel. The tree is useful for bee purposes, flowering very profusely.

#### Bosisto's Box (Eucalyptus Bosistoana).

A medium- to large-sized tree found in the southern subdivision and in the central subdivision as far north as Sydney. It occurs on a variety of soils, but avoids the poorer types and shows a partiality for limestone formations.



White or Grey Box (Eucalyptus hemiphloia).

It appears to be found both on periodically waterlogged soils and in fairly dry situations. The species is known locally as Red Box, Grey Box and Bastard Box.

Uses.—The timber is brown in colour when first cut, but dries to a pale yellowish brown. It is strong, durable and fairly easily worked, being one of the most useful timbers for general hardwood purposes, including sleepers, girders and fence posts.

#### Blue Box (Eucalyptus Baueriana).

A small to medium-sized tree found scattered throughout the southern and central subdivisions, and recorded from one or two northern localities, mainly on moderately good soils. The dark rough bark covers both trunk and branches. The leaves are of a bluish-green cast and carried in a rather dense round head.

Uses.—The timber is pale brown, strong and durable. It does not burn freely, a characteristic which, combined with its durability, makes it of value for fencing posts. The grain is often interlocked, however, making it rather difficult to split. Well-grown trees are ornamental in appearance.

Other boxes of the Coastal Division include Eucalyptus Rudderi, Eucalyptus Rummeryi, Eucalyptus quadrangulata and Eucalyptus angophoroides.

Eucalyptus Rudderi occurs mainly in the northern subdivision in the Manning and Hunter River districts, although found in the central subdivision at the foot of the Blue Mountains. It is known locally as Red Box and yields a dark-red timber, the value of which is not definitely known.

Eucalyptus Rummeryi is a medium- to large-sized tree found only in the Richmond River district on fairly deep sandy loams in sheltered sites near patches of brush forest. It appears to be a large tree with good straights stem and yields a pale-brownish timber which should be strong and durable, although apparently not easily split. It is known locally as Yellow Box, and has rough flaky or semi-fibrous bark on the butt and smooth branches.

Eucalyptus quadrangulata (see Agricultural Gazette, 1929, p. 778) is found in scattered localities in the central and southern subdivisions, extending to the Upper Hunter district. It prefers a sheltered position in good deep soils, and is commonly associated with brush patches. It is a tall-growing species with a strong, light-coloured timber.

Eucalyptus angophoroides is a medium-sized tree with a white, box-like bark which persists to the smaller branches. It is found in a few localities in the southern subdivision, mainly in hilly country on sedimentary soils. It is occasionally known as Cabbage Box. The timber is pale and moderately soft and light.

#### BLACKBUTT (Eucalyptus pilularis).

A medium to very large sized tree found throughout the Coastal Division from Twofold Bay to Queensland. It occurs on various soils, making good development on the poorer types, but appears to prefer a moderately lights.

loam of good depth for its optimum growth. It is one of the most common of the coastal trees, and reproduces itself very abundantly by natural seeding.

Uses.—The pale-coloured timber is more or less fissile, moderately strong and durable, and is one of the most commonly used for general hardwood purposes, including building, flooring and wood blocks. It is often a little gum-veined, but not sufficiently so to interfere with its usefulness. It is a very fast-growing species under good conditions, and it has been suggested that the timber of young, rapidly grown trees might be used as a substitute for softwood in case-making, &c., The tree is moderately useful for shade and shelter purposes, including breaks. and responds very well to lopping.

BANGALAY OR BASTARD MAHOGANY (Eucalyptus botryoides).

A medium-sized tree found in the southern and central subdivisions, and in the southern end of the northern subdivision, mainly in moist good soils near the sea. It makes its best development in good deep soils near running water, but is also found on fairly saline flats and rather drier sites. The bark is dark, rugged and semi-fibrous, extending for varying lengths up the trunk and larger branches.

Uses.—The reddish-brown timber is hard, strong and durable, but does not split well. Although fairly useful, it is seldom milled in this State. Mature timber is durable in the ground, and makes fair fencing posts. This species is sold and recommended by many of the nurserymen for shade and shelter purposes, and although moderately useful in these respects, is much less valuable than several of the eucalypts which are not stocked. Well-grown trees, however, are beautifully umbrageous.

WOOLLY BUTT (Eucalyptus longifolia).

A medium- to large-sized straight-growing species found in the southern and central subdivisions, and as far north as Raymond Terrace. It occurs on moist alluvial soils and on hillsides, mainly near the sea, but ascends the lower slopes of the tablelands in one or two places. The bark is dirty grey, rather fibrous and somewhat like a box, and is mainly confined to the trunk. The tree is also known as Peppermint and Redwood.

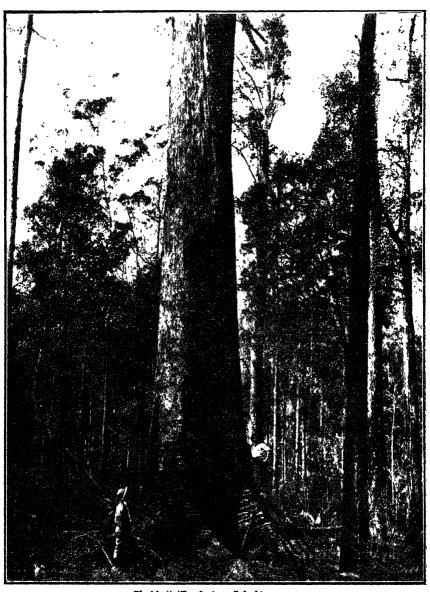
Uses.—The dark red timber is moderately heavy, but not so strong as the best hardwoods. It is very durable in the ground, particularly in damp situations, and is fairly resistant to white ants, being most useful for fencing posts. It has also been recommended for wood blocks and sleepers.

MOUNTAIN ASH (Eucalyptus Sieberiana).

This species has been fully dealt with in the Agricultural Gazette, 1929, p. 781. It occurs fairly commonly in the Coastal Division in both the central and southern subdivisions.

SYDNEY PEPPERMINT (Eucalyptus piperita).

This species is abundant on poor sandy soils in the central and southern subdivisions, and in the southern portion of the North Coast (see Agricultural Gazette, 1929, p. 748, for fuller description).



Blackbutt (Eucalyptus pilularis).

Other eucalypts belonging to the peppermint group include the following species:—

Eucolyptus pseudo-piperita, a small tree with a bark intermediate between that of a stringybark and a peppermint. It is confined to the Sydney district.

Eucalyptus Bottii. a medium-sized tree of up to 100 feet, with rough, more or less furrowed bark. It is closely related to the Sydney Peppermint, differing in its larger size, more shaft-like habit and relatively better timber. It is limited, on present records, to the area between Stanwell Park and Gosford.

Eucalyptus Joyceæ, a small tree, sometimes reaching 60 feet in height, and closely resembling the Snappy Gum (Eucalyptus hæmastoma) except for the rough, light grey, persistent bark on the lower trunk. It is confined to the Hawkesbury sandstone between Parramatta and Gosford.

The Yertchuk (Eucalyptus Consideniana) occurs as a medium-sized tree with a grey peppermint-like bark which extends to the smallest branches. It is found in both the central and southern subdivisions on poor siliceous soils, the pale-coloured timber being gum-veined and of little use.

Eucalyptus Penrithensis is found at one or two localities to the west of Sydney. It has a hard fibrous bark intermediate between that of a peppermint and stringybark, and appears to be a species of little value.

#### ROUGH BARKS.

Eucalypts included in this group are rough-barked right to the tips of the branches. As mentioned previously, some of the species included in the half barks might be more correctly transferred to the rough barks, and the two groups merge more or less into each other.

#### TALLOW WOOD (Eucalyptus microcorys).

A medium- to large-sized tree found on deep, moist, rather heavy and rich soils from a few miles south of Newcastle northwards. It is fairly common on the fringes of brush forests and extends to the eastern edge of the Table-lands. The bark is sub-fibrous and of a brick or rusty red colour.

Uses.—The timber seasons well and is one of the most valuable of our hardwoods. It is yellowish in colour, rather greasy and is heavy, strong and durable, being freely used for flooring, building, bridgework, paving blocks and fencing. It lasts well in the ground, does not burn readily, but is rather difficult to split. The tree is distinctly attractive for ornamental and shelter purposes in suitable soils, but is not frost hardy. It is more shade bearing than most eucalypts.

#### BASTARD TALLOW WOOD (Eucalyptus Planchoniana).

A small to fairly large tree found in scattered localities from Camden Haven northwards to Queensland on poor, rather sandy soils, often in association with Blackbutt and Bloodwood. The bark is fairly fibrous, the tree being frequently referred to locally as a stringybark.

Uses.—The timber is said to be heavy, hard and durable, not easily split, but saws up quite well, and is sometimes substituted for Tallow Wood.

Eucalyptus Baileyana is sometimes associated with the above species on low sandy country from the Clarence northwards, forming a rather handsome tree with a straight stem and shady crown. The bark of this species is hard and thick, although somewhat like a stringybark, the tree being occasionally known locally as Black Stringybark. Little definite information is available about the greyish-coloured timber.

#### SWAMP MAHOGANY (Eucalyptus robusta).

A small to medium-sized tree found mainly on tidal flats or along saltwaterlagoons from Twofold Bay northwards along the Division.

Uses.—The reddish timber is used for a number of hardwood purposes, including wheelwrights' work and general building, but is said to be rather brittle. It is fairly durable in the ground, especially in damp situations. The large glossy leaves make it a useful shade and shelter tree, and well-grown-trees are very ornamental. Apart from its natural condition of a more or less water-logged soil, it does quite well on fairly dry sites when grown-artificially, and apparently is moderately drought hardy. It is, however, not very frost resistant.

#### BLOODWOOD (Eucalyptus corymbosa).

A small to medium-sized tree found in all subdivisions from Bega to Queens land, mainly on poor sandy soils, but occasionally as a larger tree on better, moister soils. The reddish-brown bark covers the whole of the tree, and red-coloured kino is freely exuded.

Uses.—The timber is usually much gum-veined, precluding its use for general milling. It is, however, very durable in the ground and is more or less white ant resistant, being much in demand for fencing posts and poles.

#### YELLOW BLOODWOOD (Eucalyptus eximia).

A small to medium-sized tree found mainly on poor sandstone soil in rugged country from Jervis Bay to Singleton, extending from near sea-level to the lower slopes of the Tablelands.

Uses.—The yellowish mottled bark is most conspicuous, especially incertain seasons, and is decidedly ornamental, the species being worthy of planting, especially in poor sandstone areas. The purple foliage of the young shoots is also attractive. The timber is of little importance.

Other eucalypts of the Division include Eucalyptus Boormani and Eucalyptus squamosa. The former occurs in the Bankstown-Penrith district and is possibly a natural hybrid of Eucalyptus siderophloia and Eucalyptus hemiphloia.

Eucalyptus squamosa is found on sandstone ridges in the Broken Bay and Port Hacking districts, being a small tree with deep red timber and rather; scaly bark.

(To be continued.)

## Herd Recording Results.

THE FUTILITY OF TRYING TO BALANCE THEM WITH THE FACTORY RETURNS.

L. T. MACINNES, Director of Dairying, and J. W. G. SMITH, Dairy Instructor.

A NUMBER of the members of the Department's Herd Recording Scheme endeavour to compare and reconcile the aggregate butter-fat yields of their cows with the returns for their cream sent them by their butter-factory manager. The recording scheme is often criticised from this standpoint, and some farmers refuse to join it because the recorder's figures and those of the factory cannot be made to agree.

In view of this an endeavour has been made in the following statement to explain the matter to the satisfaction of the dairy farmers generally. The variation complained of can be understood if the following facts are kept in mind:—

- 1. The recorder works out the yield for 30-day sub-periods on one 24-hours' production. This gives only an approximate yield for the month, but on the average over the year the result has been found to be within 5 per cent. of the actual yield of each cow recorded.
- 2. The recorder enters up what the cow's milk contains, namely, butterfat. The factory records what the butter-maker packs, that is, butter. Now 100 lb. of butter-fat may be turned into from 120 to 122 lb. of commercial butter, according to the skill of the butter-maker, and the equipment and methods of the factory. On a 14 per cent. moisture content approximately 120 lb. of commercial butter would be packed from 100 lb. of butter-fat. Under the Dairy Industry Act manufacturers in New South Wales must pay cream suppliers on a basis of not less than a 14 per cent. moisture content, and for everything in excess. If the butter-maker only incorporates 12½ per cent. the manufacturer must make up the shortage to the farmer.
- 3. The herd recorder's figures show approximately what each cow gives at the bails. This information is useful for comparing—(a) one cow with another; (b) the heifer with its dam; and for ascertaining the influence the sire has had in improving the yields of his progeny as compared with those of the dams.
- 4. The factory figures show the farmer's share of the quantity of butter marketed and its realisation value. In getting the net amount of butter packed and marketed there occurs certain deductions or losses which must always be accounted for, e.g., (a) in handling the milk at the bails; (b) in using some of the milk for calves, &c., and

for the household; (c) in separating the cream (some fat always gets left in the skim-milk and the washings of the separator; (d) in handling and processing the cream at the farm, on the road and at the factory; (e) in churning the cream (some fat always gets away with the butter-milk); (f) in packing and handling the butter (some small pieces of butter often fall on the floor, &c., and in packing each 56 lb. box it is usual to allow a little extra weight to cover shrinkage before sale); (g) in the variations of the quantity of water which may be worked into the butter at each churn or each day. The variations also apply in a much smaller degree to casein, salt, and other component parts that go to make commercial butter.

- 5. The yields of the cows for the twenty-four hours over which they are tested each month (at 30-day intervals) may cause the computations for the month (each sub-period of the year) to vary from the actual amount given, because—(a) the weather conditions prevailing on the day of the tester's visit do not continue uniformly throughout the month; rain, wind, cold, heat, when extreme, affect the weight and fat content of a cow's milk; (b) the pasture and feed conditions at the time of the tester's visit may be changed or have varied before he comes again, or since his last visit. Such changes or variations during the sub-period affect the cow's production by increases or decreases per day and for the whole sub-period of 30 days; (c) sometimes the cows are given extra rations for the day when under record, and after the tester goes away they are put on ordinary feed; this will vary the yield, and if the inflated production for the 24-hours' test is multiplied by thirty to give the month's yield, it follows that the factory returns will not correspond; (d) cows that are tested just after calving, when in season, when sick or in any way upset, are irregular in their yields; (e) on recording days cows are often milked out with more than ordinary care.
- 6. The product of all cows that pass through the yards is separated (except newly calved or sick cows) and the factory's returns may thus be higher than the totalled figures of the herd recorder, as under the rules the farmer may have up to 10 per cent. of his herd exempt from test—those very aged, diseased or otherwise physically disabled.

The foregoing factors must be taken into account if it is desired to compare the factory and herd recording results, and it must be apparent that there will be a difference in nearly every instance.

Most of our butter factories are farmer owned and controlled. All of them are controlled by the Dairy Industry Act, and are under regular Government audit and inspection. The law compels that every pound of butter made must be accounted for (a) to the Director of Dairying, and (b) to the suppliers of cream to each factory. The law compels that all surplus butter

(overrun) must be distributed each month. and that the scales used for weighing cream and the glassware used for testing cream must be accurate. The Department sees that the law's provisions are given effect to.

Under such safeguards the dairy-farmer should not worry and waste time trying to check his factory by comparing the herd recorder's figures with those of the factory. Herd recording serves a very useful and necessary purpose in aiding to increase herd or cow production and yield of milk or butter-fat per acre farmed. It is not carried on to police factory operations, for which purpose it is of small value. The farmer's losses are to a very large extent made on the farm. The herd recording system ought to be used to cut out those that are brought about through under-feeding good cows and keeping low producing ones to milk and breed from. Let the herd recorder's assistance be availed of to see if the sire at the head of the herd is worthy of his position and keep. The yields of his heifers will demonstrate this as soon as they begin to be recorded. If the farmer would concentrate on building up the productiveness of his herd, he would have little time to waste in checking the factory manager, which operation is being done most effectively and efficiently by the officers of the Dairy Branch of the Department of Agriculture.

#### WOONONA AGRICULTURAL BUREAU STAGES FINE SHOW EXHIBIT.

THE excellent collection of coastal products so attractively displayed by members of the Woonona Branch of the Agricultural Bureau at their recent Show naturally commanded much attention, and should go a long way towards advertising the Bureau movement.



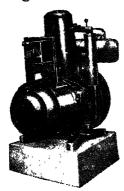
Members' Exhibit at Wonona Agricultural Bureau Show, 1980.

The accompanying photograph was kindly forwarded by Mr. F. Turnbull, Hon. Secretary of the Woonona Branch.



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## "Scabby Mouth" in Sheep and Goats.

(INFECTIOUS LABIAL DERMATITIS.)

H. R. SEDDON, D.V.Sc., Director of Veterinary Research, and H. G. BELSCHNER, B.V.Sc., District Veterinary Officer.

This disease affects both sheep and goats, but, as it is seen much more commonly in sheep, reference to that animal will be made throughout the following article, though it should be understood that similar lesions may be seen in goats.

The disease is not a new one, but hitherto the cause has not been properly understood, and the disease has commonly been attributed to the effect of thistles, crop stubble and other hard forms of vegetation upon which the animals have been feeding. Thus, the disease has been thought to be duesimply to the mechanical irritation occasioned by such vegetation. As a result of comparatively recent investigations, however, it has been found that the disease is infectious. This had already been suspected from the manner in which the condition spreads through a flock, but the proof of such had been lacking.

#### Cause of the Disease.

The cause of the disease is a virus, that is, a living agent which is too small to be seen even with the highest powers of the microscope. The existence of such a living agent has been shown, however, by the fact that if some of the crusts or scabs be ground up with water, filtered and then a little of the fluid spread over an area of skin which has been scratched lightly with a needle there results the typical scab formation seen in this disease. And from such a case the disease may be spread to other animals in a similar manner.

#### Source of the Virus.

The virus resists drying and it would, therefore, seem that natural cases of the disease result from accidental inoculation of small abrasions by scab particles which have fallen to the ground from sheep affected previously. During an outbreak, however, cases occur with such rapidity that whilst such ground infection may have been responsible for the initial cases, subsequent cases are more likely to have been due to wounding by vegetation which has been contaminated by recently occurring cases. It will thus be seen that though spines of plants, &c., are not the actual cause of the disease they assist in its setting up by making minute abrasions of the skin and so allowing of the penetration of the virus.

#### Symptoms.

The disease is, as a rule, not noticed until some of the animals of the flock are showing definite wart-like scabs about the lips. Actually the first indications are a slight swelling of the lips, followed by the appearance of a gummy

exudate on the skin and the rapid development of a hard scab which gradually becomes raised until a scab about half an inch thick is present on the lips. These scabs are dark grey to black in colour, and occur chiefly about the lips, though frequently they may be observed involving the nostrils, around the eyes, and at times at the coronet. Sometimes lesions are observed inside the lips, on the gums, dental pad or palate, and in these cases they appear as reddish, raised, spongy areas.

If the scabs are forcibly removed or rubbed off, a raw bleeding surface is seen. Later, however, the scabs may become shed spontaneously and in this case the underlying skin, though tender at first, quickly heals and the hair grows again.



Fig. 1.-Sheep and Lambs Affected on the Muzzles.

The average time taken for the scabs to reach their maximum development is about six to eight days. Following this the scabs become detached in another six to twelve days, depending on their size.

The scabs commonly involve such a large area of the muzzle that mobility of the lips is lost and as the animal is unable to close its lips the incisor teeth may be exposed, and it presents a picture of abject misery. Suckling or feeding is impossible and the animal falls away in condition in consequence. If blowflies are troublesome the affected parts are frequently attacked and the discomfiture of the unfortunate sheep thereby added to. In some cases the scab seems to cause the sheep great irritation, and as a result of the muzzle being rubbed against the forelegs or a post that part becomes raw and ulcerated.

When affected lambs are suckling it is not uncommon for the udder of the dam to become affected, particularly on the teats and the nearby skin of the udder. Scabs, similar to those seen on the lips, are produced, but sometimes the disease takes a much more severe form and a large part of the udder may become covered with a hard black leathery scab. Cases have been seen where a whole quarter has become necrotic and sloughed off.

#### Class of Animals Affected.

The disease is most commonly seen in lambs, but may affect sheep of any age provided they have not previously had an attack of the disease. The percentage of lambs affected in a flock is usually high and may be up to 90 or even 100 per cent. with a varying percentage of ewes affected on the udder.



Fig 2.—Lambs Affected on the Muzzle. One also at Inner Canthus of Eye.



Fig. 3.-Ewe with Large Lesion on Udder.

#### Immunity.

Sheep which have recovered from an attack of the disease are immune from further infection. Sheep may be immunised artificially by vaccinating them in much the same way as vaccination is carried out in the human subject for smallpox. Though the vaccination is done on the leg, the skin of other parts of the body as well becomes immune.

#### Treatment.

The use of mild antiseptic solutions and antiseptic fatty or oily dressings is very satisfactory, especially if commenced early. Advanced cases also respond to repeated dressings.

As the disease is infectious, affected sheep should, if possible, be drafted off and isolated. Too often, however, the disease when first noticed is too well established for this to be practicable.

Excellent results have been obtained in the field by dressing all affected sheep with a 5 per cent. solution of bluestone (copper sulphate) in water—one ounce of bluestone to a pint of water. The solution may be swabbed on, or the muzzle dipped in a vessel containing the dressing. This is followed by the application of a mild antiseptic fatty dressing such as the following:—

- 5 parts coal tar dip.
- 10 parts sublimed sulphur.
- 100 parts tallow, vaseline or lard.



Fig. 4.—Experimental Infection of the Upper Lip.

Best results are obtained with sheep treated in the early stages of the disease. To ensure penetration of the dressing, such scabs as are readily detachable should first be rubbed off with a flat piece of wood. One dressing is usually sufficient to clean up the condition, but it is sometimes necessary to re-dress the more severely affected cases in a few days' time; advanced cases may prove more refractory and will require special treatment. The local application of Stockholm tar to the affected parts, instead of the oily dressing, is also useful.

As a rule the udders of the ewes receive sufficient treatment from contact with the dressing on the lips of the lambs.

## Poisoning of Sheep by the Seeds of Burrawang (Macrozamia spiralis)

H. R. SEDDON, D.V.Sc., Director of Vetermary Research, and H. G. BELSCHNER, B.V.Sc., District Veterinary Officer (West).

A VERY serious and rather remarkable mortality in sheep occurred in the Coonabarabran district during May, 1929, from feeding on the seeds of *Macrozamia spiralis*, and the purpose of the following article is to describe the circumstances surrounding it. The palm in question, commonly known as Burrawang or Zamia palm, is common in coastal vegetation, and is well known as an ornamental plant. It is not confined to the main dividing range, and occurs notably in part of the Pilliga Scrub. This scrub country extends over a large area north of Coonabarabran and, at least in that part which extends to the environs of that town, the Burrawang grows commonly.

On the coast the palm is held to be responsible for a peculiar type of locomotory disorder to which the term "rickets" has been given, but it is to be noted that it is believed, as a result of field observation and also from direct experiment, that the so-called "rickets" is due to stock eating the young shoots of the palm. (This complaint is quite unrelated to the disease rickets or rachitis.)

The palm bears a very characteristic type of cone, this being at first green, and then a bright red colour. When ripe the cone splits up into a number of more or, less spherical seeds or nuts, and the mortality in question was associated with the eating of these seeds.

Up till this present record the seeds do not appear to have been



Burrawang (Macrozamia spiralis).

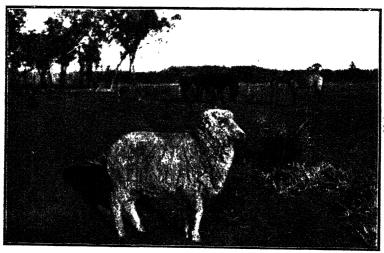
Note the fruiting cone at the base of the plant.

regarded as having toxic properties, though it may be mentioned that as a result of enquiries we learn that there are grounds for believing that the seeds have caused losses in stock before, the trouble having been ascribed at the time to some other cause. None of these losses, however, has approached in magnitude the one we are about to describe.

That the seeds had poisonous properties was apparently known to the aboriginals of this Continent, for it is stated that they soaked or heated them prior to partaking of them. Further, the records of early explorers show that several persons have suffered vomition, and even more graveillness, as a result of eating the seeds, though apparently the effects were not fatal in any particular case. Owing to this harmful reputation the seeds have been examined chemically, but in no case was any poison detected.

History of the Mortality under Review.

The sheep involved were a mob of 6,000 Merino ewes which had been depastured in the Coonamble district, where, owing to drought conditions, hand-feeding had to be resorted to for several months. In March, 1929, they were travelled by road to Gunnedah, but, rain having fallen at Coonamble they were immediately turned back. They arrived at Coonabarabran on the return journey on 22nd April.



Sheep Poisoned by Burrawang Seeds.

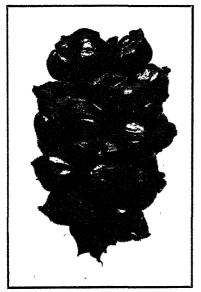
The mob was then divided into two mobs of 3,000 each, and one-pushed on so as to gain two days stage ahead of the second mob. The mortality occurred chiefly in the second mob, but the route taken by the two mobs will be sketched, as it illustrates how the second mob came to suffer more than the first.

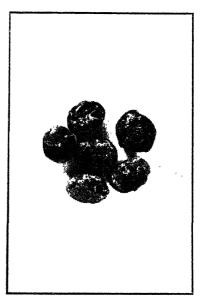
The first mob proceeded along the main Baradine Road and turned off at the six-mile peg into the Pilliga Scrub for a short distance, coming out at the seven-mile peg. Doing so they merely touched the fringe of the Burrawang country.

The second mob, on the other hand, turned off the road earlier, namely, at the five-mile peg, and, proceeding further into the scrub, traversed a valley where the Burrawang was growing thickly, and came out later at

the same point as the first mob. This route was taken in order to allow the first mob to gain distance, and, further, the second mob were not hurried, but were allowed to graze in the valley for about two hours. The second mob, therefore, not only traversed more of the Burrawang country than the first, but also were allowed to spend much more time on it than the first mob.

The happenings in this valley were described to us by the drover in charge. The valley had been entered as there was a good amount of feed there. In addition to grasses and other edible herbage there were the palms, but as stock had been taken through the same valley previously without ill results no particular thought was given to them until it was noticed that the sheep greedily sought out the nuts or seeds, for the cones





Unripe Cone (left) and Ripe Seeds (right) of the Burrawang.

When ripe the cone falls apart and sets free the seeds. Note the marks of the sheep's teeth on the seeds.

had fallen apart and the seeds were scattered on the ground. The drover noted that this was happening, but as the seeds were not known to be harmful he did not feel uneasy on the matter. He had, however, to catch a few sheep to remove nuts that had become jammed between their molar teeth.

That afternoon the sheep were driven from the scrub, were watered and camped for the night on a flat, and in this particular mob the first knowledge of any trouble was the finding of five sheep dead on the camp next morning.

#### Details of Mortality in each Mob.

It will perhaps be better to deal first with what we have termed the second mob, as it was among them that the heaviest losses were experienced.

In the second mob the first mortality (five sheep) occurred about eighteen to twenty hours after the sheep had eaten the nuts, the animals having meantime been watered and camped over night. During that day twenty more died, and as others were noticed to be ill the sheep were not travelled. The following morning fifty-five more were found dead, and the remainder of the mob were travelled slowly for 4½ miles, twenty-seven sheep dying on the way. The following morning seventy-five were found dead, and approximately the same number the next day. During these two-days the mob travelled slowly to M., where they were placed on agistment (and where they were seen by us). Losses continued for a considerable-period after, as will be seen from the following table:—

Date.						Died.	Total to date.	
25-4-29 (day	after	eating	Burra	wang)		25	25	
26-4-29	•••	•••	•••	•••		82	107	
27-4-29	•••	•••	•••			87	194	
28-4-29		•••		•••		72	266	
29-4-29	•••	•••	•••	•••		64	330	
30-4-29	•••	•••		•••		62	392	
1-5-29		•••	•••	•••		60	452	
2-5-29	•••	• • •	***	***		50	502	
18-5-29	•••	• • •	•••	•••	•••	•••	1,600	
14-6-29	•••	• • •		***	•••	••	1,850 (still a few sheep dying.)	,

The mortality in the *first* mob was not nearly so heavy. Two sheep died the morning after they passed the Burrawang, and nine the following day. Deaths continued in this mob, but at a low rate per day. Nevertheless, the losses in this mob were in themselves quite severe, for in all about 350 sheep died.

Thus in the two mobs of 3,000 each, 1,850 died in one and 350 in the other a total mortality of 2,200 sheep out of 6,000.

#### Investigation into the Cause of the Condition.

On the second day of the mortality the losses were reported to Mr. Stock Inspector Bucknell, of Coonabarabran, who immediately went and inspected the mob. As a result of his investigations he attributed the cause of the mortality to the ingestion of the Burrawang seeds (portions of which he found in the paunch of sheep examined). Inspector Bucknell was aware of the fact that the aboriginals apparently knew of the toxic nature of the nuts, and was thus able to suggest the cause. Material was forwarded to the Veterinary Research Station by him, and also by Mr. Stock Inspector Ryan, who was called in in connection with the mobwhich had gone ahead.

Owing to the unusual nature of the mortality the District Veterinary Officer (H. G. B.) decided to investigate, and in his inspection was accompanied by the other writer.

#### Personal Field Investigation.

Immediately on arrival at Coonabarabran on 30th April we inspected the mob, and gained full information as to the movements of the two mobs and the losses to date, and next morning examined the second mob and conducted several post-mortem examinations.

The sheep in which the greatest mortality occurred were then depastured in a large paddock at M., 20 miles north-west of Coonabarabran. There were then about 2,500 sheep in this mob, and of them at least 700 to 800 were obviously sick. Dead sheep were scattered over the paddock, fifty having been counted that morning. Many of these animals were lying alongside the fence and others, showing marked narcotic symptoms, were seen standing with their heads poked through the wire.

Later, we walked through the scrub over the route taken by the sheep, from the seven-mile to the nine-mile peg, passing through the valley where the Burrawang was growing in profusion. Grass had been eaten well down, and the nuts had evidently been consumed in considerable numbers. Palm after palm showed merely the binding substance of the cone, and perhaps an odd nut on the ground, but the greater quantity had been cleaned up. We found several nuts which bore evidence of having been partially chewed and later quidded by the sheep. Other vegetation was examined, and several plants collected for identification. None of these, however, were plants to which suspicion could be attached, and we felt that all the evidence tended to confirm the tentative diagnosis of poisoning from the seeds or nuts of the Burrawang palm (Macrozamia spiralis).

#### Why the Sheep Ate the Burrawang Nuts.

It must be apparent to any one reading this account that (a) the nuts would ordinarily be a type of food that one would not expect sheep to take, and (b) it is remarkable that no such mortality had been experienced before, especially as sheep have frequently been travelled along the same route

Regarding the first, it has been mentioned that for a period of some eight months (from June, 1928, to March, 1929) the sheep had been handfed, the feed including a pressed concentrate made up in a small cake or nut. They had, therefore, been thoroughly accustomed to eat a fodder in that form, and the concentrate being particularly relished by sheep once they become accustomed to it, it is not surprising that they ate the Burrawang nuts with avidity.

As to the absence of previous mortalities—and here it may be mentioned that the same sheep actually passed through the same valley some seven weeks earlier—one must remember that the seeds or nuts are, until quite ripe, bound together in the form of a cone, and in that form would not be available to stock. The cones seen by us were in just that state at which they were falling apart and the nuts were lying in little heaps on the ground at the base of the palms. The sheep in question were strong,

and, generally, in good health. Nevertheless they had for a year been subject to more or less privation, firstly on their home run on account of drought, and more latterly on the stock routes they had travelled for the preceding nine weeks. They were thus thoroughly educated to "forage," and though not starving would have been hungry when they entered the fatal valley.

#### Symptoms Seen in Affected Animals.

The chief symptoms were those of acute dysentery, the breech being badly stained by foul-smelling, tarry material; anaemia, the visible murous membranes being pale as a result of internal haemorrhages; jaundice, from the grave haemoglobinaemia present; fever, general weakness and listlessness. The urine was dark from the presence of haemoglobin or bile pigment. The amount of jaundice was variable. In addition, animals were seen to show frothing at the mouth, nervous twitching of the lips and muscles of the face, together with spasmodic movements of the head. Several were seen to show marked narcotic symptoms, wandering aimlessly into trees and fences and remaining standing with the head firmly pushed against some solid object. Such animals would stand in that attitude until they died.

#### Post-mortem Appearances Seen in Natural Cases.

On skinning the carcase more or less yellowness of the tissues was seen, and blood collected and examined later showed haemoglobinaemia, and in some cases the presence of bile. Numerous haemorrhages were seen in the subcutaneous tissue, in the muscles and, in fact, throughout the carcase. They were fairly constant, and usually quite extensive under the epi- and endo-cardium. These haemorrhages varied in size from mere pin-heads to large blood extravasations 3 or 4 inches across. The ictoric pigmentation, as mentioned above, was variable, but in some cases was especially well marked.

The internal organs showed, as the most constant and pronounced nakedeye changes, more or less intense acute haemorrhagic inflammation of the fourth stomach and intestines, and an enlarged, yellow (but mottled) liver, which change appeared to be a marked venous congestion with extensive fatty change and loading of the organ with bile pigment, the organ being commonly coppery in hue. The gall bladder in most cases was enormously distended, and in some the bile was thick and viscid. The kidneys showed marked mottling of the cortical zone.

In summary, there was evidence of the action of some extremely toxic substance, especially on blood vessel walls (allowing of haemorrhage into tissues and extensive haemorrhage into the bowel), on the red blood cells themselves (leading to marked haemoglobinaemia and subsequent jaundice of a haemolytic type), and on the parenchyma of the liver and kidneys. The pathology of the condition will be discussed more fully in an article dealing with the investigations carried out subsequently at

the Veterinary Research Station in collaboration with workers at Sydney University, in search of the active principle in the seeds. Suffice it to say here that subsequent microscopical examination, and chemical tests in the Physiology Department of Sydney University, of material from natural cases have confirmed the view that the general nature of the pathological effect is a toxic haemoglobinaemia (with, often, jaundice), acute enteritis and extensive haemorrhage generally.

#### Measures Taken in Connection with the Mortality.

At the time the field investigations were undertaken there was no information as to the nature of the toxic principle in the seeds, and, therefore, nothing in the way of direct antidotal treatment could be attempted. It was obvious that those animals that were sick had suffered gross tissue destruction, and the best that could be hoped for was to endeavour to accelerate the elimination of poison from their bodies, and by diet, &c., to assist repair of injured tissues. The manager was therefore advised to leave the sheep where they were, and to continue to feed them, but not to give them too much concentrated food (maize). It was further suggested that green feed in the form of green lucerne or green crop be secured for the sheep. In view of the state of the bowels a violent purgative drench was not considered advisable, but the owner was advised to make a laxative salt lick available in the paddock for the sheep.

After resting some days, the sheep were travelled slowly towards their home station in order that they might be got to good grazing on natural grass pasture. As subsequent events showed, and as we expected, a large number of the sick sheep died, no doubt as a result of extensive damage to internal organs. It was noted that in the later cases the congestive type of Jesion became less frequent. In this connection, it may be mentioned that we have since found that with minimum toxic doses of the seeds, sheep may suffer a comparatively long illness, and death not take place for three or four weeks after ingestion of the seeds.

#### Proof that the Burrawang Seeds were Responsible for the Mortality.

Some of the seeds were brought back to the Veterinary Research Station, and one of us (H. R. S.), and Mr. R. O. C. King tested them by administration to sheep, when it was found that the kernels from 8 oz. (about thirty) nuts (seeds) constituted a fatal dose for a sheep. The symptoms and lesions noted by us in these experimental cases were exactly the same as those seen in natural cases in the field. (A full account of these investigations will be published later).

#### Identification of Palm.

For confirmation as to the identity of the palm in question, we are indebted to the Director of the Botanic Gardens, Sydney (Dr. G. P. Darnell-Smith).

## A Maintenance Ration for Sheep.

FEEDING EXPERIMENTS AT TRANGIE EXPERIMENT FARM.\*

Accurate information as to the minimum amount of feed required to maintain a sheep is of considerable importance to the sheep owner. Because of periodic droughts it is essential that he should have the fullest possible information in regard to the relative values of the different feeds and the quantities required to keep sheep in a healthy condition, for, with this data available, he could determine the feeds most suitable and the approximate cost of feeding.

With the object of acquiring information in regard to these points it was decided to institute experiments at Trangie Experiment Farm. It is difficult to carry out experiments of this nature satisfactorily. The principal difficulty is that under ordinary paddock conditions sheep are able to find, even during the worst drought conditions, some rough feed such as coarse grass and leaves, but the amount cannot be determined. The experimental work must be under complete control, and necessarily the sheep are confined in small enclosures where they receive only the feed given to them. The amount therefore must be sufficient to maintain them, but it is probably greater than would be required had they the run of a paddock. In considering the results of this experiment it has to be borne in mind that the sheep received no other feed, and in applying them, allowance must be made for any feed which sheep may pick up in the paddocks.

Again. variety in the ration is of considerable importance. Even under drought conditions, stock get some variety in the paddocks and in general feeding it is advisable to introduce it by giving different kinds of feed.

These experiments were planned chiefly as preliminary work to more diversified investigations, and only simple rations were selected. It was expected that some useful information in regard to feeds and quantities would be obtained, and also that the experiment would be a guide to future work.

Plan of the Experiment.

Three lots, each of five Merino ewes, were included in the experiment, which was commenced on 1st November, 1928, and they were fed the following rations:—

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Lot 1 ... Silage, 2½ lb. per head per day.

Lot 2 Silage 1½ lb. ...

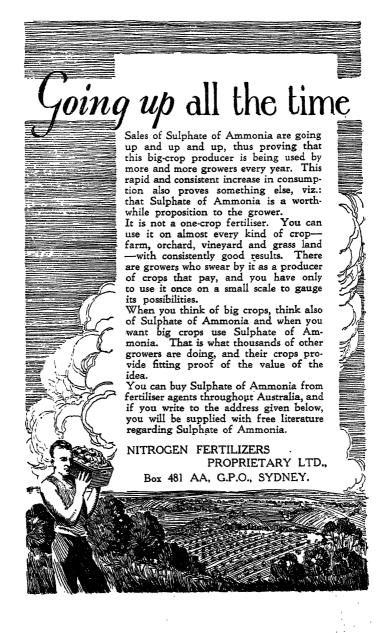
Hay 1 lb. ...

Lot 3 Silage 1½ lb. ...

Maize 4 oz. ...
```

The sheep was also allowed a free supply of a lick composed of salt 100 lb., Epsom salts 6 lb., and sterilised bonedust 20 lb.

<sup>\*</sup> Report of an investigation arranged by a committee consisting of Messrs. A. H. E. McDonald, Director Agriculture: Max Henry, Chief Veterinary Surgeon: E. A. Southee, Principal, Hawkesbury Agricultura College; and E. A. Elhott, Sheep and Wool Expert.



## Department of Agriculture

New South Wales.

LIST OF PUBLICATIONS OF THE DEPARTMENT.

PART 1—
Sale Books and Bulletins.

PART II—
Free Publications.

Copies of this list are obtainable, free of charge, from the Under Secretary, Department of Agriculture, Box 36a, G.P.O., Sydney.

In each lot the sheep showed a disinclination to eat the feed and fretted in the yards for some time. They gradually settled down, however, and eventually all readily took the feed.

The hay was apparently the most palatable, as, after nine days, each day's ration was consumed, and from then on practically none was left. The sheep also took readily to silage, as they were consuming practically the whole of it by 12th November, and from then on the only wastage was some of the rough straw.

The sheep did not take readily to maize, and it was 14th December before they were cleaning up the full day's ration. From then on they ate it readily.

#### The Foodstuffs Used.

Silage was fed as follows:-

1st November to 23rd April—
Wheaten.

23rd April to 27th April—Oaten.
28th April to 6th May—Wheaten.
28th May to 14th May—Oaten.
28th May to 1st June—Wheaten.
2nd June to 7th June—Oaten.
28th June to conclusion—Wheaten.

Hay.—Wheaten hay from the 1928 harvest was fed from 1st November, 1928, to 30th April, 1929. From 1st May to the conclusion, oaten hay was used. The oaten hay was rather long, but served as roughage very well, although it could be regarded as more suitable for large stock than sheep. Both oaten and wheaten hay were of good colour and prime quality The hay and silage were produced on Trangie Experiment Farm.

Maize.—The maize was good quality yellow feed maize, bought in the market.

#### The Food Consumed.

The following table shows the total quantities of foodstuffs consumed each month by each group, with the averages per sheep.

MONTHLY Quantities of Feeds and Lick Consumed.

-71	ONTHLY	Angum	pies of	reeas	and Lick	Cor	ısum	ea.			
1	Group 1.	Group 2.				1	Group 3.				
sil	age. ' Lic	ek. S	Silage. Lick. Hay.		Hay.	Sil	Silage. Maiz		aize.	ize. Lick.	
Per group.	Average Per sheep. Per group.	Average Per sheep. Per group.	Average Per sheep.	Per group. Average Per sheep.	Per group. Avorage Per sheep.	Per group,	Averago Per sheep.	Per group.	Average Per sheep.	Per group.	Average Per sheep:
1928 lb. November 2893 December 3103		lb. lb. -3 151 -65 205	30-35	lb. lb. 1 ·2 23 ·55	lb. lb. 123½ 24•7 155 31	lb. 160} 215}	lb. 32·15 43·05	oz. 165 368	oz. 31 73•0	lb. 2 4	lb.
February 304½ March 364 April 309½ May 317½ June 333½	72.8 61 61.85 11 63.45 51	1·2 205 ·73 176 1·3 226 ·35 192 1·01 190 ·6 196 ·85 233 233 107	35·25 45·35 38·55 38·0 49·1 58·8 58·8	41	155   31 139   27.9 155   31 148   29.7 155   37.5 150   37.5 155   38.7 165   38.7 16.25	214 <sup>1</sup> 195 224 194 192 <sup>1</sup> 212 <sup>1</sup> 255 283 <sup>1</sup> 107 <sup>1</sup>	42.9 39.0 44.8 38.8 38.84 42.4 31.0 46.6 21.4	600 560 620 600 620 600 620 620 260	120 112 124 120 124 120 124 124 124 124	20 12 21 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6 ·1 ·3 ·4 ·5 ·25 ·44 ·19
Totals	635-6	7-0	462-05	4.89	337-6		42U-9	•••	1124-6		4.42
Duration of trial	289 days.	1	319	days.	, , , , ,	,	, , , 3	19 da	ys.	,	,

#### Average amount of Feed per Head per Month.

Group 1 Group 2	•••	•••	 •••	 Silage 66.88 lb. Silage 44.07 lb.
Group 3		•••	 	 Hay 32·19 lb. Silage 40·13 lb. Maize 6·70 lb.

#### The Cost for Twelve Months.

Taking the cost of silage as £1 10s. per ton, of hay as £3 per ton, and of maize as 5s. 6d. per bushel, the following table shows the cost per head of feeding the sheep in each group over a period of twelve months:—

Group.	Average a	Cost.	Total Cost.				
1	802 lb. silage	•••	•••	 •••		 s. d. 10 9	s. d. 10 9
2	528-9 lb. silage 386-28 lb. hay	•••	•••	 •••		 6 4 10 6	} 16 10
3	481.59 lb. silage 1,286.76 oz. maize	 = 1	 bushel	 •••	•••	 6 0	3 4

In addition the following average amounts of lick estimated on a twelve months' basis were consumed per sheep:—Group 1, 8.11 lb.; group 2, 5.62 lb.; group 3, 5.05 lb.

#### The Losses in Weight.

The following table shows the losses in weight of the animals to shearing (8th August, 1929), and to the conclusion of the trial:—

Losses in Weight during Trial.

Group and Sheep No.	Weight at commence- ment (1st Nov , 1928).	Weight at shearing (7th Aug., 1929).	Loss during period 1st Nov., 1928, to 7th Aug., 1929.	Average group loss per sheep (1st Nov, 1928, to 7th Aug., 1929.)	Weight at conclu- sion of trial.	Loss during trial.	Average group loss per sheep during trial.
Group 1	113 103 116 91 109 112 127 109 91 91 97	1b. 781 86 64 75½ 61½ 100½ 103 85½ 00½ 86½ 91½ 72 86½ 90	1b. 17½ 27 39 40½ Died 11½ 24 23½ 8½ 13 15½ 31 10½ 15	11. 31 12-62 16-25	1b. 69 74 55 63 91 97 84 85 73 55 64 70	1b 27 39 48 53 20½ 30 24½ 6 42 38½ 27 27	1b. 41.75 20.25 32.1

#### Feed Consumed in Relation to Weight.

In the following table the loss or gain in weight at the end of each month is shown beside the average amount of feed consumed per day during the month.

FEED Consumed per Head per Day and Monthly Losses or Gains in Weight.

Month	Avera	das pei de amoun	t of feed heep eac	consume h month	d	Loss or gain in weight of indivi- sheep to end of each mont				
	(110up.	Silvæ	Lick	Hay	M uze	she	ep to er	d of eac	h month	l.
1928. November	No. { 1 / 2 / 3	lb 1 90 1·13 1 07	lb. •01 •0066 •013	lb. 82 	oz.  1·1	lb. + 2 - 1 3	lb. 2 13	1b. - 6 - 7 - 1	lb. - 5 + 8 + 2	lb. 15 + 5 + 1
December	$\cdot \left  \left\{ \begin{array}{c} 1\\2\\3 \end{array} \right. \right.$	2 003 1·32 1·39	02 011 -025	i'''	 2.37	- 7 - 1 - 5	$\begin{bmatrix} -7\\ -3\\ \cdots \end{bmatrix}$	- 3 - 2 - 6	- 8 - 2 - 1	${\begin{array}{c} +25 \\ -2 \\ +5 \end{array}}$
1929. Janu 113	$\left\{\begin{array}{c}1\\2\\3\end{array}\right.$	2 27 1·302 1·38	-038 -027 -019	i"	3-8	$\begin{bmatrix} -3 \\ -3 \\ -2 \end{bmatrix}$	$\begin{vmatrix} -4 \\ +2 \\ -4 \end{vmatrix}$	$     \begin{array}{r}       -8 \\       -7 \\       -2     \end{array} $	$\begin{vmatrix} +2\\ +3\\ -5 \end{vmatrix}$	-10 + 7 - 4
February	$\cdot \left  \left\{ \begin{array}{c} 1\\ 2\\ 3 \end{array} \right. \right.$	2·17 1·25 1·39	·026 ·017 ·003	i" 	ţ	$\begin{bmatrix} -2\\ \S -32\\ -2 \end{bmatrix}$	- 2 1	— 5 — 2 — 5	§— 2 — 18 …	§— 6 — 1 — 8
March	$\cdot \left  \left\{ \begin{array}{c} 1\\2\\3 \end{array} \right. \right.$	2·34 1·46 1·44	·042 ·027 ·008	i	 4	$\begin{bmatrix} -3 \\ -11 \\ -3 \end{bmatrix}$	$     \begin{array}{r r}                                    $	- 1 - 2 	$-12 \\ -4 \\ +2$	-11 - 6 - 1
April	$\left\{egin{array}{c}1\2\3\end{array} ight.$	2·06 1·28 1·29	·016 ·011 ·013	ı	 4	$\begin{vmatrix} -2 \\ -4 \\ +1 \end{vmatrix}$	$     \begin{array}{r}         -2 \\         -1 \\         +4     \end{array} $	$-1 \\ -6 \\ +1$	$\begin{vmatrix} \\ +2 \\ +1 \end{vmatrix}$	$     \begin{array}{r}         -3 \\         +6 \\         -1     \end{array} $
May	$\left\{ egin{array}{l} 1 \ 2 \ 3 \end{array}  ight.$	2·04 1·22 1·24	·035 ·017 ·016	i	  4	${-7}$	- 4 - 1 - 1	8 +- 1 +- 4	- 7 + 5 + 3	$   \begin{array}{r}     -7 \\     +3 \\     +3   \end{array} $
June	$\cdot \left\{ \begin{array}{c} 1 \\ 2 \\ 3 \end{array} \right.$	2·22 1·31 1·41	-02 -01 -008	i	4	         - 2	 2 3		$\begin{bmatrix} -1 \\ -3 \\ -5 \end{bmatrix}$	— 4 
July	$\left\{ egin{array}{l} 1 \ 2 \ 3 \end{array}  ight.$	2.5 1.87 1.5	·027 ·012 ·011	 1·25 	 4	*— 2½ *— 3	*2 *2 *+ 1	*7 *15		*+ 1½ * 3½ * 9
August	$\left\{ egin{array}{c} 1 \\ 2 \\ 3 \end{array}  ight.$	2·5 1·87 1·5	Rain	{i·25 	4	†— 2½ — 4½	1 1	†— 2 — 6]	†— 2 — 14 — 5	Died 31 - 3
September	$\cdot \left  \left\{ \begin{array}{c} 1\\2\\3 \end{array} \right. \right.$	1·87 1·5	Rain	{1.25 	4	;+ <del>1</del>		1+1	‡="1	1.4

<sup>\*</sup> Losses and gams, 30th June to 8th August.

<sup>||</sup> Slaughtered.

Losses to 16th August (end of trial for group 1.) § Replaced during trial.

<sup>·</sup> Losses and gains, 31st August to 16th September (end of trial).

#### The Wool Aspect.

The fleeces of the sheep in the above trial were inspected by two prominent wool men on the 20th August, 1929, and as a control, a sample of the top line of the Trangie clip was procured; this was valued at 13½d. per lb.

The following is a summary of their remarks:-

Lot Fed on Silage.—These fleeces were light, dry, tender, thin and wasty with no body. Two fleeces were cotted. The wool (on the market at that time) would be worth approximately 12½d. per lb. The yield of this wool was 46 per cent.

Lot Fed on Silage and Hay.—The fleeces were well nourished, attractive, soft and well-grown; medium in condition and sound except for one fleece (No. 2,240), which showed slight tenderness. This was a more attractive wool than the control (the wool grown under paddock conditions), being, of course, more free of dust and lighter in condition, with less discolouration due to yolk. Market value, 15d. per lb.; yield, 50 per cent.

Lot Fed on Silage and Maize.—These fleeces carried a little more condition than the previous ones, and were therefore not so bright and attractive. There was, however, very little difference between them. The wool was practically all sound; market value, 14d.; yield, 48 per cent. It was suggested that the possibility of maize being the cause of the heavier condition and consequent slight discolouration, might be further investigated.

The following table shows the fleece weights and values per head and per group:—

Wood values I et Head.											
Group .		Sheep.	Fleece Weight.	Price per lb.	Value.	Average Value per head.					
Group 1—Silage		No. 2,232 2,246 2,233 2,234 2,235	lb. 7 9 7 10½ 6½	pence.  12½ 12½ 12½ 12½ 12½ 12½	s. d. 7 3½ 9 4½ 7 3½ 10 11 6 9	s. d.					
Group 2—Silage and hay	•••	2,237 2,238 2,239 2,240	8½ 7 8½ 10	15 15 15 15	$ \begin{array}{c cccc} 10 & 7\frac{1}{2} \\ 8 & 9 \\ 10 & 7\frac{1}{2} \\ 12 & 6 \end{array} $	10 71					
Group 3—Silage and maize	•••	2,241 2,242 2,243 2,244 2,245	9 8 9 11 9	14 14 14 14 14	10 6 9 4 10 6 12 10 10 6	10 9					

WOOL Values Per Head.

The light fleece of No. 2,238 (7 lb.) spoilt the average of the silage and hay lot.

#### Health Notes.

The health of the sheep in this trial was observed by the District Veterinary Officer (West). They were first inspected in January, 1929, when one of the sheep was found to be very ill. As it appeared that it would not live for another day, it was killed. The causes of sickness were held to be two, faulty assimilation and lack of nourishment, plus drain on the animal's system from the well-developed foetuses, and internal parasitic infestation.

Careful examination showed that in Group 1 (sileage alone) two sheep exhibited white skins, one pale pink skin, and one normal. In Group 2 (silage and hay) all sheep appeared to be normal, and in Group 3, two showed pale skins and three were normal. The sheep on silage were then falling away and were cleaning up the silage very slowly. Shade was provided in all yards, good water was available, and the yards were kept clean.

Faecal examination at Glenfield Veterinary Research Station showed that Haemonchus contortus, Ostertagia ostertargi, and Trichostrongylus extenuatus were present. Instructions were, therefore, given for the sheep to be drenched with copper sulphate and mustard. This was done on 13th February, 1929. At that time Group 2 (silage and hay) were in best condition, then Group 3 (silage and maize), and lastly Group 1.

One of the ewes in Group 2 died in February from jaundice.

The sheep were drenched again 28th February, 1929.

In April, the sheep on silage, although losing condition gradually, were bright and showed fairly clear skins. The hay and silage group was still the best. Faecal examinations from individual groups showed that the worm infestation was least in Group 1, so that parasites could not be held responsible for the loss in condition.

In June it was evident that the sheep in Group 1 (silage alone) were nearing the end of their endurance. The sheep on hav and silage were a little better than the silage and maize group. The consumption of salt was increasing.

In August it was decided to withdraw the silage alone group from the experiment. Faecal examinations at this time showed a far heavier infestation by worms in the silage alone group than in any other.

#### Condition of Sheep at Conclusion of Trial.

The sheep were shorn on 7th August, 1929, and the trial terminated on 16th September (Lot 1 on 16th August).

Lot 1 (silage only).—The sheep in this group were difficult to shear owing to the cotting of the fleeces. One sheep collapsed off shears, and had to be transported to the pen and rugged and nursed. All sheep in this group were in very low condition and they were very weak at the conclusion of the trial; one sheep died on the day of release. One sheep in this lot had died on 8th December, 1928, and one was cast and killed on 15th January, 1929.

Lot 2 (silage and hay).—The condition of these sheep could be termed, at the conclusion of the trial, as that of forward stores. They maintained

their condition throughout the trial better than those in either of the other two lots. One ewe in this group was cast on 8th January, 1929; this ewe died on 21st February.

Lot 3 (silage and maize).—At the conclusion the sheep in this lot could be described as in store condition, and not up to the condition of Lot 2.

#### Comments on the Experiments.

The experiments give some useful information in regard to the amount of teed required to maintain a sheep in a healthy condition. The quantities, and consequently the costs, however, are subject to variation according to the amount of feed which is available in the paddocks.

The sheep in Groups 2 and 3 remained in good healthy condition throughout. Possibly, if the trial had been extended over an indefinite period they would ultimately have shown signs of suffering, but apparently the feeds given will satisfactorily maintain a sheep during long periods of drought. Those in Group 2 (receiving silage and hav) were, at the end of the trial, in better condition than those receiving silage and maize.

The sheep in Group 1, which received silage alone, failed to thrive and lost condition quickly. It became apparent soon after the commencement of the trial that silage alone is unsuitable. At the end of the trial, the sheep were in a very low condition and could not have been carried much longer. This, however, is not an indication that silage is unsuitable for sheep, as those in Group 2 (receiving silage and hay) remained in good condition. This is in accordance with our experience in feeding large numbers of sheep during drought. In conjunction with other feed, either hay or grain, silage is a suitable ration, but it must be fed in this way if good results are to be obtained.

#### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows: these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

	24		
Trangie (F. H. Hayles)	June 3, 4.	Corowa (H. Norton)	Sept. 2, 3.
Narrandera Sheep Show (J. D.		I Parkes /T. S. Secharn)	` ດ໌ດ
Newth)	July 15, 16,	Roorowe	'' a' =
Cootamundra Sheep Show	00.01	Course	
Young Sheep Show (T. A. Tester)	., 23, 24.	Barmedman	
Peak Hill (W. R. L. Crush)			
Cilmandes (C. Obsista)	Aug. 5, 6.	Bogan Gate (J. a'Beckett)	
Tullemone (C D Conserve)	12, 13.	Temora	
Tales Commellens	., 13.	Canowindra	
Terral Of D Female	19, 20.	Forbes (E. A. Austen)	., 16, 17.
Trundle (W. P. Forrest)	19, 20.	Barellan	, 24.
	20.	Ardlethan	. Oct. 1.
Grenfell	., 26, 27.	Quandialla	, 1.
Condobolin (J. M. Cooney)	26, 27.	Walbundrie (H. G. Collins)	1.
Wagga (F. H. Croaker)	26, 27, 28.	Harr (Common C MacCon alread)	1, 2.
Gunnedah	26. 27. 28.	Narrandera (J. D. Newth)	H 0
Ungarie	., 27.	Bribbaree	
Gaiston (W. J. Fagan)	30.	Ariah Davis	c
Junee (G. W. Scrivener)	Sept. 2, 3.	Griffith	14 1-
West Wyalong	., 2, 3.	Contempodre	ຄາ່ວນ
Murrumburrah	6 6	Cootamandra	, 21, 22.
	,, <u>~</u> , D.	**	

### Birds and Animals Protection Act.

#### A Synopsis of the Act.

Under the amended Act, which was assented to on 17th April last, stock inspectors, and all field officers of the Department of Agriculture have been appointed as rangers. A synopsis of the principal Act as amended, more especially as regards matters incidental to the duties of rangers, is printed hereunder.

A protected bird or animal, as defined by the Act, includes the eggs, skin, feathers, or any other part.

#### Sanctuaries.

Apart from a number of sanctuaries already proclaimed, all land (including water) within a radius of 1 mile of any public school is a sanctuary for birds and animals, exclusive of the following species, viz.:—Sparrows, silver eyes, cormorants, crows, ravens, starlings, bul buls, rabbits, hares, dingoes, foxes, and flying foxes. Complete protection is afforded to all birds and animals in the following sanctuaries, viz.:—Barrack Head, Brush Island, Dangar's Lagoon, Deep Lagoon, Hawdon's Lagoon, Lake Illawarra, Jenolan, Wombeyan and Yarrangobilly Caves areas, and property of Waratah Golf Club, Ltd.

#### Rangers.

For purpose of enforcing the provisions of the Act, a ranger is empowered to exercise the authority of a constable, and may enter any land or premises, and examine, without hindrance, any nets, traps, &c., which are being used in contravention of the Act. Any person reasonably suspected to be offending against any of the provisions of the Act, and who refuses to give his real name or address, may be arrested—penalty not exceeding £5. Any person who assaults, resists, or encourages any other person to assault, &c., or who uses any abusive language to a ranger, renders himself liable to a penalty not exceeding £10.

#### Offences.

Any person who uses or carries for other than naval or military purposes a firearm having a greater length of barrel than 36 inches, or having a bore exceeding 10 gauge, or having more than two barrels, or being of a weight exceeding 16 lb. avoirdupois, is liable to a penalty not exceeding £20. Firearms must not be affixed to any boat, &c., or be other than those which, are habitually raised at arms' length and fired from the shoulder without other support.

Any person who aids, abets, counsels, or procures the commission of any offence also renders himself liable to the same penalty.

Any person who, except during the period of an open season, takes or kills any protected bird or animal, or uses any gun, explosive, dog, net, or instrument or means whatsoever for the purpose of taking or killing any protected bird or animal, or who during an open season fails to comply with any prescribed condition or restriction relating to the taking or killing of any protected bird or animal, or to the use of any gun, explosive, dog,

net, or instrument or means whatsoever for the purpose of taking or killing any protected bird or animal, shall, upon conviction, be liable to a penalty not exceeding £20.

The minimum penalty for any offence under the Act or regulations is £1, and any firearms, nets, traps, or other instruments, or any dogs found in the possession of any person when the offence was committed, are liable to forfeiture and to be disposed of as the Court may direct.

Poisoning.

Any person who uses potassium or sodium cyanide, or a mixture of the two, for the destruction or attempted destruction of any bird or animal, whether protected or not, unless he may have secured an exemption, is liable to a penalty not exceeding £50, and also to imprisonment not exceeding six months. Any person who uses any other poison for the destruction or attempted destruction of any protected bird or animal is liable to a similar penalty.

Open Seasons.

The Minister may declare open seasons in respect of any protected bird or animal, and may also declare what birds and animals are unprotected. Notification of such is published in the Government Gazette.

#### Unprotected Birds and Animals.

Birds.—Sparrow, silver eye, cormorant, raven, pied crow shrike or black magpie, friar bird or leather head, yellow-throated friar bird, miner or soldier bird, white cockatoo, galah, lory or crimson rosella, rosella parrot, Blue Mountain parrot, eagle, snipe (except painted snipe), common starling, red-whiskered bul bul, little black and grey falcons, peregrine or black-cheeked falcon, grey goshawk, white goshawk, form of grey goshawk and Australian goshawk; pelicans in the police districts of Albury, Balranald, Cooma, Deniliquin, Gundagai, Hay, Hillston, Moama, Narrandera, Tumut, and Wagga Wagga.

Animals.—Rabbit, hare, dingo, fox, flying fox, and paddymelon; wombats in the pastures protection districts of Braidwood, Bombala, Cooma, Eden, Goulburn, and parishes of Coolah, Dalglish, and Mumbedah in the county of Napier.

Open Season for Certain Protected Birds.

Gill-birds-15th April to 31st July.

Pelicans—1st October to 28th February in police districts of Bourke and Windsor.

Stubble Quail (only)-15th May to 15th July.

Wild Ducks (excluding blue-billed and musk duck)—15th February to 30th April.

Corella, king parrot, cockatoo parrot (quarrion), mallee parrot (Barnard parakeet, bulla bulla), red-winged lory (crimson wing), red-rumped grass parakeet, coots, black-tailed native hen, black moor hen, spotted-sided finch (diamond sparrow), chestnut-eared finch (zebra), goldfinch, red-browed finch (redhead), and chestnut-breasted finch—1st February to 30th June.

## Prospects for the Marketing of Australian Fruits Overseas.

DIGEST OF REPORT BY MR. J. W. BLICK.

Since his return from a world tour of investigation into the fruit marketing methods of, and the prospects of placing Australian fruits in, various countries, Mr. J. W. Blick, of the Producers' Co-operative Distributing Co. Ltd., Sydney, has compiled a somewhat extensive report, setting forth his observations and experiences, and giving much useful information for the guidance of the intending exporter.

ing exporter.

While each enquirer into marketing methods and requirements of countries abroad adds something new to our knowledge of the subject, all are equally emphatic that it only remains for our exporters to send out the very best, got up in a manner designed to meet the demands of importing countries, to ensure Australia obtaining a fair share of the overseas trade. Mr. Blick, a digest of whose report is printed hereunder, also found that a strong feeling on the question of trade within the Empire existed in all British countries.

#### Markets for Citrus Fruits.

Canada is a potential market for citrus, and substantial extension should also be possible in the East. To develop trade in those parts of the world, however, it is necessary that Californian methods and packages, including the continuous supply of large quantities of fruit under a common brand, be adopted. These methods in packing and marketing oranges have practically set a standard all over the world, and Australian progress will be simpler and extension more rapid if they are adopted than if we set up standards of our own and have to convince oversea traders that same, together with our fruit, are of equal if not better value than their purchases from U.S.A.

In California the meticulous care with which the fruit is handled in the packing sheds with a view to obviating the possibility of the skin being in any way bruised is most striking. The same care is exercised in the picking, handling, and transfer of the fruit from the trees to the shed. Before being graded and sized, lemons are washed and brushed for ten minutes in soft soap and water at a temperature of 115 deg. Fah., and then immersed for five minutes in a bath of bluestone and water at a temperature of 110 deg. Oranges are treated by being first put over the brushes, and then for twelve minutes travelled through a bath of warm water impregnated with "Wyandotte" or "Mermaid" cleanser, the temperature of the solution being 110 deg. Fah. They are then sprayed with cold water and subsequently dried as they travel over rollers on their way to the grading tables. By a simple contrivance the word "Sunkist" is stamped on each orange or lemon entering the grader. Although this process is a simple one and involves no extra work on the part of any of the staff and but a small outlay for the appliance, it has done a wonderful lot to popularise the "Sunkist" pack in all parts of the world, for the fruit retains its identity through all trading transactions right into the hands

of the consumer. Coloured wraps are universally used; they improve the appearance of the fruit in the cases, while the attractive labels stand out boldly on the ends of the cases.

The following are the counts of oranges of different sizes packed in the Californian  $1\frac{1}{2}$ -bushel case, which sized case is most favoured:— $3\frac{1}{2}$ -inch, 80;  $3\frac{1}{2}$ -inch, 100;  $3\frac{1}{2}$ -inch, 126; 3-inch, 150;  $2\frac{3}{2}$ -inch, 176;  $2\frac{3}{2}$ -inch, 216;  $2\frac{1}{2}$ -inch, 252;  $2\frac{3}{2}$ -inch, 288;  $2\frac{1}{2}$ -inch, 312;  $2\frac{1}{2}$ -inch, 344; and  $2\frac{1}{16}$ -inch, 392.

There does not appear to be a market of any size for Navel oranges in Canada, although it appears likely that fair trade could be done with Valencia late oranges. The most favourable times for the arrival of our citrus fruit in Canada would be when Californian supplies were light, that is, in October and November. Prices are at their highest then, and delivery in these months would fit in with the Australian Valencia season. The ocean trip to Vancouver takes three weeks, and cities as far east as Toronto and Montreal would only involve an additional seven to ten days rail journey.

Outside Canada and the East there seems little hope, at the moment, of developing a profitable and permanent oversea trade in oranges, either Valencias or Navels. With its large population, close proximity, and regular and frequent transit, U.S.A. (particularly the north-west and middle states) offers a possible market, but under existing regulations our fruit is not allowed entry on account of the presence of fruit fly in this country. It was explained that large areas are free from fruit fly and there seems a possibility of having the embargo removed in respect of fruit from clean areas. In the United Kingdom and on the Continent, consignments arriving in October could be expected to sell to advantage, but production is increasing so rapidly in other parts of the world not so far removed from Europe (and consequently advantaged by cheaper freight rates) that agents, almost without exception, expressed the opinion that in two or three years at most the gap in supplies during October, which exists at present, would be completely bridged.

In order that citrus growers may fully comprehend the position, the following figures are quoted to indicate the restricted markets for citrus outside the boundaries of the Commonwealth. The export of oranges from Spain to Great Britain increased from 4,012,000 cwt. in 1920 to 7,117,000 cwt. in 1926, and from 438,000 cwt. to 2,609,000 cwt. to France in the same period; in 1921 there was no export to Germany, but in 1926 the quantity was 1,995,000 cwt. The area under citrus in Palestine in 1924 was 5,900 acres, but in 1928 it had increased to 13,600 acres, and exports to Great Britain in that year amounted to 1,729,200 boxes. Imports of South African oranges to United Kingdom were 524,000 cwt. in 1927; 864,054 cwt. in 1928; and 1,096,000 cwt. in 1929. In 1928 a trial shipment of 200,000 boxes of oranges was sent from South America to United Kingdom, and as packing and transport are being improved and the area rapidly extended, this quantity could be very materially increased, even at the

#### Apples.

The English market still holds good prospects for Australian apples, but a particularly high standard is demanded. The spreading of Australian shipments of apples to United Kingdom over a number of ports rather than delivering them all at one centre appears to be a wise policy. Provincial values are very largely based on London values plus the cost of transportation. If the latter item can be lessened, the consignor receives a corresponding benefit. One difficulty often encountered is the fact that subsidiary markets can be more easily overloaded than a central one, and to obviate this difficulty and the possibility of loss, some competent authority should be on the spot to ascertain requirements beforehand, and deal accordingly with shipments as they arrive.

New Zealand apples at present are winning a higher reputation than the Tasmanian product on the English market, because of their superior appearance, grading, and maturity.

Last season Western Australia landed 20,000 cases of apples at Rotter-dam, which port receives a considerable proportion of the goods imported by central European countries. Yellow apples are most popular in Holland, and consequently Cleopatras found most favour, selling at 20s. 10d. per case. Imports into Holland are subject to a duty of 8 per cent. on selling price.

Australia is at a disadvantage concerning trade with Germany, not only in respect of apples, but all fruits. As an example, it is mentioned that the duty on Australian apples is 3s. per case as against 1s. on apples from U.S.A., South Africa, and other countries.

Granny Smith apples from New South Wales give the fullest possible satisfaction and are regarded by traders in the Dutch East Indies as the best obtainable anywhere. They, however, place much importance on regularity of supply and the adoption by this country of a single brand under which Eastern traders could buy with confidence. This also applies to fruits other than apples.

#### Grapes.

Although grapes shipped to Vancouver last season showed on arrival a percentage of decay due to faulty handling, grading, and packing, consignments forwarded for several years have, on the whole, been well received. It is only necessary for all fruit to be landed in perfect order for Ohanez to command increasing trade. Ohanez are not fit to pick till April, and as the demand slackens when strawberries come on the Canadian market in June, only one shipment annually could be made. Trade between Australia and Canada, as between Australia and the Straits Settlements, is at present somewhat handicapped by high freight rates.

The \(\frac{3}{4}\)-bushel cases used are approved of and preferred to the \(\frac{1}{2}\)-bushel cases. A case containing 25 lb. net weight is recommended as ideal; an official report regarding a brand carrying 28 lb. to the case stated that

the grapes showed sweating as a result of the pack being too tight. The fruit was also bruised as it was not sufficiently protected by the cork dust, and retailers reported that they received more saleable grapes out of the cases containing 25 lb. than they did out of those carrying 28 lb. Precooling is considered unnecessary.

In Malaya, Java, and other Eastern centres grapes are popular, especially among the Chinese who attribute to them some special medicinal value. The \(\frac{3}{4}\)-bushel case, with grapes packed in cork dust, meets in every way the requirements of the trade there. Ohanez from Victoria and Western Australia are, however, considered by many fruit people in the East to be of better quality than the New South Wales pack, the fruit being larger and more attractive in appearance.

Trade with the United States is dependent upon the removal of the embargo on the importation of all fruits from Australia, but agents stated that if our grapes were eventually admitted, liberal quantities would be distributed in the north-western and central-western States. The duty on grapes is 1 cent in U.S.A. and 2 cents in Canada.

In view of the possibilities of increased trade, and of the necessity for finding fresh outlets and of retaining those already found, it is imperative that the greatest possible care be exercised in the selection of the New South Wales fruit and the packing of same. Small fruit should, at all times, be discarded; bunches should be large so that when hung up in shops they will appeal to the public; and faulty berries, no matter how slight the defect, should be carefully clipped off. The grapes should be allowed to mature before being harvested, but packed at such a stage that the stalk will not rapidly wither and die. Cork dust should not be too coarse, and cases should all carry an attractive label on the end. Brands should not be numerous—the fewer the better—as traders prefer to stock only one brand, provided the contents are right.

#### Pears and Stone Fruits.

In the United Kingdom pears are a popular line and have only to be landed in good order to realise satisfactory prices over a period of years. Varieties popular are Winter Nelis, Winter Cole, Commice, Josephine des Malines, P.K.T., and W.B.C. Some agents recommend marketing our pears in trays, but the majority, especially in provincial markets, consider the half-bushel dump case a better package.

In the East there is a limited demand for pears, peaches, plums, and cherries; greater for pears than the others, but in season traders like to stock some of these other lines to add variety to the supplies they have to offer.

#### Bananas.

Many of the distributing agents for bananas in the United States have refrigerating machinery and plants controlling temperature and humidity, and ethylene gas is, in some instances, used to colour the fruit. The

## SAFE GUARD for your STOCK

## Osmond's Animal Medicines

The best after-calving and general drench for cows is undoubtedly

## "OSMOND'S RED DRAUGHT"

PREPARES THE COW FOR CALVING AND WARDS OFF MILK FEVER. Quickly cures bad cleansing, impure milk, loss of cud, indigestion, Mawbound, Costiveness, and Low Condition.

Sold in air-tight and damp-proof canisters. No. 1, approximately 60 drenches, 63/-

No. 2, approximately 30 drenches, 32/6

#### SAVE THE COW

PREVENT ABORTION

with

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Remove the cleansing and disinfect the calf bed. For obstinate cases of bad cleansing, for preventing abortion, for cows turning from the bull, &c., always insert a Pessary.

No cow should ever be allowed to calve without first inserting an Osmond's Pessary.

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NOTE.—Osmond's Pessaries should always be used in conjunction with Osmond's Red Draught.

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Farm and Station Workers available, including—

Ploughman — Bushworkers
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Dairy Families . . .
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Boys and Youths for Farms
and Stations

Cheap Railway Concession Fares Advanced
NO FEES CHARGED

Wire or Write your Requirements:-

To MANAGER, 132 George Street North, Circular Quay, Sydney bananas are imported in bunches, and in summer the trucks conveying the fruit inland are iced. At present U.S.A. draws her supplies of bananas from Central and South America, Cuba, Jamaica, and Hawaii.

To the United Kingdom and the Continent bananas are imported from the West Indies, Canary Islands, and Trinidad in bunches wrapped singly and packed in straw in crates, and in this way they carry in excellent condition.

#### Selling Methods.

Export to the East should, it is considered, be confined to an f.o.b. or c.i.f. basis. The market is a restricted one, supplied principally from U.S.A. and Australia. All fruit obtained from the former country is supplied on order and under Letter of Credit at a definite price. New South Wales fruit is supplied under the same system, but a good deal from Western Australia is sent on consignment. European importers buy to cover orders obtained from native dealers; they point out that consignment business, being indefinite, unsettles the trade.

On the other hand, in the larger markets, such as in the United Kingdom, on the Continent and in Canada, where the population is entirely European, large business is only possible on a consignment basis. In Canada in particular it is recommended in preference to f.o.b. sales, because selling competition under the latter method has already forced grape prices down, and its continuance would still further reduce them. F.o.b. business will also restrict the quantity going forward, and for that reason make expansion of trade difficult.

It is considered that the agency in Great Britain that gives the best service is the one that employs both the auction and the private treaty methods of selling. Those operating in this way are obviously in touch with a large section of small buyers, and the assistance of this class of trader is very helpful when it comes to dealing with lines of fruit that open up faulty and would be sacrificed if auctioned. Agents so situated can withdraw these lines, re-pack if necessary, and in that way obtain for their clients the maximum returns.

#### Advertising.

The imports of foodstuff into Great Britain are so immense that this market is competed for by all countries, with the result that a particularly high standard of presentation is demanded for successful marketing. There is also a very noticeable tendency for the development of national marketing, as contrasted with individual effort; specific examples of this are Australian butter under the "Kangaroo" brand, and "Sunkist" oranges from California. The principle advantages of such schemes are the possibility of advertising a single brand and the greater marketing control that comes with the elimination of unnecessary competition, and it seems unquestioned that this system of collective marketing has been to stay and will develop.

In addition to advertising in this market, it is necessary to formulate a scheme for bringing New South Wales fruits directly under the notice, not only of dealers, but of the consuming public in Canada and the East. Both in wholesale establishments and fruit shops, attractive posters or advertisements featuring Australian fruits should be displayed to stimulate an inquiry and demand for our products. Granny Smith apples are undoubtedly popular in the East, and nothing could be more effective than an attractive poster or advertisement suitably displayed showing a branch with several beautiful Granny Smith apples on it, and the words, say

## NEW SOUTH WALES GRANNY SMITHS THE WORLD'S BEST

Our Ohanez grapes, pears, and citrus fruits could be brought prominently before the public in the same way, and in Canada an Australian flag and the words "Foster Inter-Empire Trade by Eating Australian Fruits" handsomely embossed on the placard and displayed in every shop in Canada stocking New South Wales grapes during the brief period of the year that they are being offered, would stimulate sales.

#### INFECTIOUS DISEASES REPORTED IN APRIL.

The following outbreaks of the more important infectious diseases were reported during the month of April, 1930 —

		•••		•••	•••		Nil.
Blackleg				***	•••		5
Piroplasmosis (tick f	ever)	•••	•••				Nil.
Pleuro-pneumonia co			•••		***		2
Swine fever				0 p.d	***		Nil.
Contagious pneumor	ia	***	***		***	124	Nil.

-Max Henry, Chief Veterinary Surgeon.

#### SUPPLIES OF ANGORA RABBIT WOOL FAR EXCEED DEMAND.

Speciment resemble and control of the second state of the second s

In view of the interest that has been taken recently in the farming of furbearing rabbits, and of the varying reports as to the prospects in the industry, the advice received by the Queensland Minister of Agriculture and Stock in reply to a cable he sent to the Agent-General in London for the purpose of ascertaining the true state of the market for rabbit wool is interesting. According to the cable, the supplies of Angora rabbit wool far exceed the demand, and the average price for first-grade wool is about £1 3s. per lb. The market for Chinchilla rabbit pelts is also much depressed, as prices for "best winter" only reach 5s. but average about 2s., with heavy stocks on hand.

From the foregoing it would appear that caution is necessary before launching out in the industry, at any rate on a large scale.

#### IMPORTS AND EXPORTS OF FRUIT.

The following table, compiled by the Government Statistician, shows the imports and exports of fruit—fresh, dried, and processed—during the quarter ended 31st March, 1930:—

Description.	Imports.	Exports.	Description.	Country of Origin.	Imports.	Exports.
	İ	, ,			-	
Interstate.			Oversea.		l	
	Cases.	Cases.	Fresh Fruits-		Centals.	Claudala
Fresh Fruit	050 010	76,704	Apples		Centais.	5,278
Tomatoes	41 049		Bananas		8,231	0,2,0
		pkgs.	Lemons		6,231	369
Melons		423	Oranges		2,231	899
	doz.		Grape Fruit	*********	721	
,,	. 493		Pears			1.675
• •	tons.		Pineapples	***********		549
,,	. 67		Other	*******	1,322	2,181
	cases.		Dried Fruits—		1	
,,	. 124		Apples, Pears,		lb.	lb.
		bags.	Peaches, etc.	U.S.A	9,500	
,,		47	Apples	*******		499
	lb.	lb.	Apricots			5,774
Canned Fruit	242,095	196	Currants	Greece	22	21,347
	!		Figs	Asia Minor	5,221	
Dried Fruits-				Greece	1,913	
Unspecified		37,364		Turkey		
Currants	2,660	112		U.K		•••
Raisins .		56		U.S.A	1,742	
Apricots	392		Peaches		•••	132
Apples		l i	Prunes	U.S.A	48	3,874
Peaches			Raisins—			
Pears		- :::	Sultanas	********	•••	25,347
Prunes	. 1,848	5,740	Lexias	*********		114
		1	Other		***	1,888
			Dates	Egypt	153	12,410
			0	Mesopotamia	2,487,088	
			Other	China		2,222
				U.S.A	6	•••
			Preserved in liquid -			110 500
	1		Apricots	*******	•••	110,529
			Peaches	***********	•••	354,621
			Pears	**********	•••	5,927
	1		Pineapples	***************************************	•••	559
			Raspberries		•••	109 199
	Į.		Other	************	Galions.	20,166
					11,292	***
				1	,	

#### THE VALUE OF FEEDING STANDARDS.

FEEDING standards must be regarded as general guides, and small departures from them need cause no worry, especially when the ration can only be precisely adjusted by the purchase of expensive foods. Errors, of course, do not add, but tend to balance; nevertheless it is only an optimist who can expect them to neutralise themselves exactly, and with so many approximations as must necessarily be introduced in rationing, the final result can never be absolutely reliable.—H. G. Sanders, in the Journal of the Ministry of Agriculture, England.

### Orchard Notes.

JUNE.

C. G. SAVAGE and R. J. BENTON.

Marketing Citrus Fruits.

Most varieties of citrus fruits will now be maturing. In order that buyers may be attracted and the best returns realised, the product must be presented in a well-prepared form.

First, picking must be carefully done, preferably with clippers. Two cuts are recommended—the first to remove the orange with a twig attached and the second to remove the twig at the calvx of the fruit. Though one cut may be faster, too many portions of stem remain, which injure the rind of adjoining fruit in the picking bag. Specially-made picking bags are necessary for reducing the possibility of injury and for economy in effort and time.

After careful sizing the fruit should be packed honestly and firmly in the cases. Allowance for shrinkage is necessary; as the fruit may be some time en route to the purchaser, a full or high pack is preferable. The maximum number of fruits should be packed in a case—not the least number required to fill it. A chart on the packing of citrus fruits is available free on application to the Department, Box 36A, G.P.O., Sydney.

While some growers, by their location, may with advantage market their fruit within a very limited period at a particular time of the season, the great majority of growers are compelled to extend their harvesting period. Regular consignments throughout the season are strongly recommended. Continuity of supply of a regular brand is most helpful in establishing a trade connection.

#### Intermediate Crop Oranges.

Owing to the irregular setting of main crop oranges in coastal localities, it may be found during the next month or two that fruit is setting as a mesult of trees blossoming during the December to early March period. Such fruit will be of no value and should be removed from the trees when opportunities permit.

Fruit setting as a result of later than mid-March blooming may be of value, but crops from intermediate blossoming, which it is impossible at times to prevent setting, are undesirable.

#### Handling the Lemons and Grapefruit.

While the main crop of lemons is not a large one, rates will probably be low during the winter, inducing many to hold for peel and juice requirements by manufacturers in the early spring. The greatest proportion of lemons is sold when freshly picked, but it is believed that it would be of advantage to the industry if the public could be induced to use

more cured lemons than has been the custom to date. The lemon is mainly needed for its juice content, and in the fresh state is not comparable with the cured fruit. Fruit most suitable for curing is of "silvery" or green colour and should be clipped when a diameter of about 2½ inches is attained. Such fruit, stored in paper-lined boxes in a shed, should hold in excellent condition up to a period of three months at this time of the year.

Pickings of fruit should be made about every six weeks—as size is attained.

Grapefruit may be cured in a similar manner to lemons, and are thereby marketable later in the season and in a better condition than if allowed to remain too long unpicked. Picking should be done when the fruit reaches an even, pale-yellow colour.

#### Frost Protection.

Though the methods adopted in other countries are not practicable here, nor are they as often required, still occasional locations and conditions occur in which some loss may result from frost injury. Where soils are dry and good crops are being borne, and heavy frosts are expected, the land should be well broken up to absorb any rain which may fall and to destroy any weeds which may be extracting the last of the moisture present. If a water supply is available an irrigation should be given. Further protection will be afforded by reducing the crop as early as possible, picking the outside or exposed fruit first.

#### Deciduous Trees.

The earlier deciduous fruit trees are planted now, the better their chance of becoming quickly established. Their root development is active months before the upper portion shows any sign of leaf formation. Roots should be carefully inspected for freedom of gall-like growths, pruned with care to remove any damaged roots, and the trees planted at about the same depth as when growing in the nursery, as is indicated by the lighter colour of the portion beneath ground level.

The pruning of deciduous trees must be continued without delay, as the time for spraying and early summer cultivation to commence is rapidly approaching. Where powdery mildew is in evidence on apple trees, affected twigs should be removed.

#### Preparing Land for Bananas.

Mr. H. W. Eastwood, Fruit Instructor, Byron Bay, reminds growers of bananas that though planting operations will not commence till spring, growers who have not yet made a beginning with the preparation of land for planting, should do so without further delay.

Virgin country should be chosen if procurable, as it is the most suitable for the growing of this fruit. The felling of the timber is done during May, June, and July. It is of advantage to fell scrub timber at least three months before burning if possible, and, as forest timbers take longer to dry and do not burn as well as the former, they should.

be down for a longer period if a good burn is to be obtained. Lantana does not require such a lengthy period to dry out, and from six to eight weeks is sufficient.

A good burn is dependent upon good felling and the time allowed for the logs to dry out, as well as on local weather conditions and winds at the time of firing. Threatening weather as the planting season approaches encourages planters to put the fire stick in to save the possibilities of prolonged delay, and in many cases the firing is premature, and a poor burn is the result. This means extra work in logging up and subsequent building of small fires to get rid of the partially-burnt logs.

Risks have to be taken when firing, but, provided the planting season is not drawing to a close, it is better to err on the safe side and secure a good burn than put up with obstructions and inconveniences in working the plantation.

The felling of the timber is usually let by contract. The grower should insist on getting a thorough fall and so ensure that there are no standing trees which may be uprooted or the heads broken off after the plantation is established, with the likelihood of serious damage not only to his plantation but also to his neighbours.

Where grassland is chosen, it should be ploughed this month and worked at intervals in such a way as to destroy all the grass and roots; then allowed to remain till the approach of spring when another ploughing should be given, followed by the necessary cultivation to get the land into good tilth before planting.

The foregoing preparation for grassland is the minimum which can be expected to give anything like satisfactory results, and a well-planned scheme over a longer period would be much more beneficial.

Land which has been under grass for years loses a good deal of its fertility and is depleted particularly in organic matter. Determined attempts should be made to restore this loss to the soil before planting bananas, as it is much more difficult to do so afterwards. The best way this can be accomplished is by cultivation and green manuring (incorporating in the soil undecomposed plant material with the object of increasing the fertility), though this involves waiting a further twelve months before planting the bananas. Leguminous plants are more valuable than non-leguminous ones for this purpose because of the increased amounts of nitrogen they fix in the soil through the nodules on their roots, thereby increasing the nitrogen content of the soil. The above ground portions of the plants, when turned under, also add nitrogen, besides organic matter, which is extremely valuable to most of the North Coast soils, as they are deficient in this material.

To begin this longer preparation the land should be ploughed in June and prepared for the planting of a suitable summer leguminous crop about October. Suitable legumes are cowpeas, velvet beans, rice beans, or Jerusalem peas and Mauritius beans. As bulk of green material is the object with this crop, it should be assisted by chemical manures applied at sowing time. When the green manure crop has reached the stage of

maximum growth it should be ploughed under. The land should then be fallowed during the autumn and winter with an occasional working to keep it free of weeds and in good condition.

Before planting bananas in the spring, by which time the green manure crop will have decomposed, the land should be ploughed again and finally prepared for planting.

#### TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Addr		Number tested.	Expiry date of this Certification.				
Department of Education, Gosford Farm Ho	mes				87	24 May,	1930
William Thompson, Masonic School, Baulkh	am Hills				27	24 ,,	1930
F. W. Hopley, Lecton		,,,	•••		29	29 ,,	1980
J. F. Chaffey, Glen Innes (Ayrshires)				[	56	29 .,	1980
P. Ubrihlen, Corridgeree, Bega		•••	•••		119	8 June,	1930
E. P. Perry, Nundorah, Parkville (Guernsey	B)	***	•••		23	14 .,	1930
Sacred Heart Convent, Bowral	-, ···	•••	•••		11	17 July	1980
A. Shaw, Barrington (Milking Shorthorns)	•••	•••			120	2 Aug.,	1980
St. Patrick's College, Goulburn			•••		9	7 ,,	1930
Walter Burke, Bellefaire Stud Farm, Appin	(Jersevs)		***		52	17 ,	1980
Mittagong Farm Homes, Mittagong		•••			85	80 .,	1980
H. W. Burton Bradley, Sherwood Farm, Mo.	orland (	ferseve	)		79	4 Sept.,	1980
James McCormick, Tumut		***	•••		94	5 ,,	1930
Walaroi College, Orange	***		•••		8	19 ,,	1980
Riverstone Meat Co., Riverstone Meat Work	s. River	stone	•••		115	27 ,,	1980
J. L. W. Barton, Wallerawang		•••	•••		18	9 Oct.,	1980
Blessed Chanel's Seminary, Mittagong	•••				5	25	1980
H. A. Corderoy, Wynna Park, Comboyne	***	•••	•••		54	1 Nov.,	1930
Glen Innes Experiment Farm (Ayrshires)	***	•••	•••		62	3 ,,	1930
S. G. Winkley, Dorrigo	•••				85	8 ,,	1930
J. Davies, Puen Buen, Scone (Jerseys)	***				40	1ĭ ;;	1930
Department of Education, Brush Farm, East	twood		•••		7	22 ,,	1930
Lunacy Department, Callan Park Mental Ho	enitai		•••		28	29 ;;	1980
Bathurst Experiment Farm (Jerseys)	- p-1	***	***		80	1 Dec.,	1980
Lunacy Department, Morisset Mental Hospi	tal	•••	•••	••••	21	7 Jan.,	1931
Parbery, C. J., Allawah, Bega	***	•••	•••		88	× .	1981
Wagga Experiment Farm (Jerseys)	•••	•••	***	- 1	78	70. "	1931
Kinross Bros., Minnamurra, Inverell (Guerns	lavs)	•••	•••	•••	72		1981
New England Girls Grammar School, Armid	lale		•••	••••	i9		1931
Lunacy Department, Parramatta Mental Ho	Brital	•••	•••	***	89	00	1931
Miss Brennan, Arrankamp, Bowral	O \$1 K DEGA	•••	•••		10	19 Feb.,	1981
Department of Education, Yanco Agricultur	al High	School	***		33	Ph. 4	1931
G. A. Parrish, Jerseyland, Berry	*** ****		•••	***	103	O-00	1931
Lunacy Department, Kenmore Mental Hosp	ital	•••	•••	***)	76	00	1981
Hawkesbury Agricultural College (Jerseys)		***	•••	•••	160	1 Mar.,	1981
St. Joseph's Girls' Orphanage, Kenmore	•••	***	•••	••••	10		1931
St. Michael's Novitlate, Goulburn		***		••••	5	à "	1981
Truncas Cohoel Ween W. I.	***	•••	***	***	8	4	1931
St. Joseph's Convent, Reynold-street, Gould	11Pn	••••	•••	***	4	4 ,,	1931
St. John's Boys Orphanage, Goulburn		•••	•••	•••	7	5 ;	1981
Marion Hill Convent of Mercy, Goulburn		•••					1931
	•••	***	***	***	20	0 "	1931
Discoulant Waldone Tlames Trames	•••	•••	***	***	69	ā ''	1931
Wilkins, James, Jerseyville, Muswellbrook	•••	•••	• • • •	•••	51	46 '' .	1931
Tudor House School, Moss Vale	***	***	•••	•••	8	01	1981
	•••	•••	•••	***	220		
Classificate Thermanism and Therman (1	•••	***	• • •	***	180		
Department of Education, Huristone Agricu	lenval Tr	lah dal	nnol'	•••		10.	1981 1981
Navua Ltd., Grose Wold. via Richmond (Je	LI INCHON	ifit Oct	TOOT	•••	41 13	10 ,, 29 .,	
	LOUYD)	***		***			1981
Anstrollan Wissionery College Commission					1 K 1	00	1001
Australian Missionary College, Cooranbong McQuillan, J. P., Bethungra Hotel, Bethung	****	•••	***	***	45 6	80 ,, 1 May	1981 1931

### Poultry Notes.

JUNE.

#### E. HADLINGTON, Poultry Expert.

On all commercial poultry farms a start should be made with hatching operations at the beginning of this month. Whether light or heavy breeds are being kept makes no difference as to the wisdom of early hatching. It is true that most of the early pullets, light breeds in particular, will fall into a partial moult during the autumn, but what is lost during the moulting period is compensated for by the number of eggs laid before the pullets moult, and the enhanced prices obtained for the market cockerels; also by the fact that the early birds can safely be used for breeders by the following June. Another important point is that these birds lay larger eggs from the commencement of laying than those hatched late in the season.

#### Care of the Breeding Stock.

One of the chief considerations during the breeding season is to keep the breeding stock in good condition, and it is only by so doing that the best results can be expected. This is where keen powers of observation are necessary—to see immediately when anything is amiss with the birds, instead of allowing ailments to become very pronounced before they are detected, which may mean that affected birds would be useless for the remainder of the season. To the quick observer a bird's comb becoming dark in colour, a slight listlessness in the appearance of a bird, and a disinclination for food, are signs of impaired health, and frequently a timely dose of Epsom salts given by taking a teaspoonful of salts, damping them so that they will hold together until placed in the bird's mouth, will save further complications.

A frequent occurrence is that the male struts about at feeding time calling to the hens while they eat up the food, and consequently he becomes poor in condition. The best means of guarding against this trouble is to give the male bird a feed of whole maize by himself at midday. This can be done by shutting the hens in the house and feeding the male in the yard. At first a little difficulty may be experienced in separating him from the hens, but the birds soon become accustomed to the practice and are quite easy to manipulate after a week or so. The trouble entailed in feeding all male birds at midday whether there appears any necessity or not, would be amply repaid in the improved hatching results obtained.

#### Feeding.

Care should be taken that the ration fed to all the breeders does not contain a high percentage of concentrates, as this is often the cause of poor hatches. It is a safe plan to use not more than 5 per cent. of meat meal or other concentrates equally high in protein, for the breeding stock, and it would be

advantageous to add about 2 per cent. of bone meal in place of 1 per cent. of meat meal for breeding birds—making 4 per cent. meat meal and 2 per cent. bone meal.

#### Look for Vermin.

Periodical examinations should be made of the male birds to see that they are not infested with vermin, which often results in a high percentage of infertile eggs, or "dead in the shell" chickens. A simple means of ridding the birds of body lice is to paint a thin line of commercial nicotine sulphate (40 per cent.) along the perches shortly before the birds go to roost. Care is necessary not to apply the solution too liberally or to spill any where the birds may pick it up, because it is highly poisonous. A sure indication of a heavy infestation by body lice is a broken condition of the feathers around the thighs and abdomen of the birds, or a redness of the skin of the abdomen, particularly at the base of the tail, which is a favourite location for body lice.

Various other methods of eradicating these parasites, such as dusting flowers of sulphur thoroughly through the feathers of the birds, placing a few pinches of sodium fluoride on different parts of the body, or dusting with insecticides, will be found effective.

Infestation of the houses by red mites is sometimes a cause of poor results during the breeding season, but it is usually not until later in the season that this pest is likely to become troublesome, as the mites are more or less dormant during the cold weather. It is as well, however, to be on the lookout for these parasites, which, if present, will be found underneath the perches, or in the crevices of the walls around the perches. If action is taken as soon as the mites make their appearance on the perches by painting with crude petroleum, kerosene emulsion or residual oil, or even waste oil from a motor car engine, they can be kept in check, but if they spread to the walls and floors of the houses it becomes necessary to spray the houses two or three times at intervals of a couple of days with some good spraying solution. About the cheapest and most effective spray is kerosene emulsion, which is made as follows: - Dissolve 1 lb. soft soap in 1 gallon of boiling water, then add slowly 1 gallon of kerosene, stirring the mixture thoroughly all the time and for a few minutes after the oil has been added. This is the "stock" which should be added to 9 gallons of soft water, when it is ready for use. The mixture should be stirred frequently when being used. A fine flat spray is the best to use for penetrating all the crevices without undue waste; the type of nozzle which throws a round spray is not suitable for the purpose.

Another effective spraying solution is red oil which should be used at the rate of one part to twenty parts of water, but this is more expensive than kerosene emulsion.

#### Long Spurs.

A matter which is often overlooked when breeding birds are being selected is the spurs of the male birds, and frequently cocks two years old and over are seen in the pens with spurs over 2 inches long. In such cases it is a simple matter to cut off the spurs by using a fine-toothed saw. A hack saw is most

suitable, but any other sort with small teeth can be used. In performing the operation an assistant should hold the bird's legs firmly, preferably on a box, in such a position that the sawing can be done readily without injury to the legs or feet of the bird. The person using the saw should stand behind the bird and hold the spur with one hand while sawing. The spurs should not be cut too close to the legs, for this causes excessive bleeding; in most cases if about ½ inch is left, very little bleeding will occur, and any that does can be easily stopped by applying a hot iron to sear the cut surfaces. Even younger birds which have sharp spurs should have the points trimmed, but the cutting should not be as close as for older birds.

#### Size of Eggs.

In selecting eggs for the incubators it should be made a hard and fast rule not to include any that are less than 2 oz. in weight. There is always a strong temptation early in the season to use a percentage of eggs which are not up to the desired weight, in order to fill up the incubators quickly. This tends to perpetuate the small egg trouble, because in many cases the early-hatched birds are used for breeders the following season, and it is not possible to discriminate between those hatched from large or small eggs; as a couse-quence birds which may have an inherent tendency to produce small eggs are probably used. It is only by care in this direction, selecting breeding stock of good physique, and rearing the chickens under the best conditions to secure good development, that the small egg difficulty will be overcome.

#### Keeping Eggs for Incubation.

Poultry-farmers with only a small flock often find it difficult to fill up an incubator early in the season without the eggs becoming somewhat stale, but rather than wait for sufficient eggs to fill the incubator it would be better only partly to fill the machine with eggs not more than a week old, because the longer the eggs are kept over that age the less is the chance of a successful If, however, eggs have to be kept longer than a week, they should be placed in a box, covered in bran and turned once or twice daily. If the eggs are so packed that they will not move about in the box, the turning can be done by turning the box over. Eggs being kept for incubation even for a few days should be covered over or kept in boxes with lids on to prevent undue evaporation, and also later in the season to protect them from the changes of temperature—from frosty nights to very warm days. The room in which eggs are stored should be as even in temperature as possible, airy, and yet not draughty, and be free from strong odours. These matters all tend to make a difference in the hatching results, yet on many farms no consideration. appears to be given to them.

The function of roughage—the coarser foodstuffs—in the ration is to form the bulk of food, distend the digestive tract, increase peristalsis, and satisfy the appetite of the animal.

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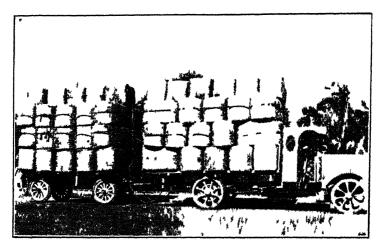
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1st July, 1930.

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Agricultural Gazette of New South Wales.

### Mallee Farming.

E. S. CLAYTON, H.D.A., Senior Experimentalist.

Up to the present more attention has been paid to the development of mallee areas in South Australia and Victoria than in New South Wales. It is only in comparatively recent years that such country has been utilised for wheat production in this State, but already the results have justified the venture, and wheat is now being successfully produced on this class of country.

The main areas which up to the present have been brought under production in New South Wales are situated in the vicinity of Wyalong, and along the Rankins Springs, Lake Cargelligo and Hillston lines. Developmental work has also been commenced on the Benance and Balranald areas. The accompanying map shows the whole of the mallee areas (shaded light blue) in the State.

Recently an investigation was undertaken with the object of inquiring into all the aspects of mallee farming in Victoria, South Australia and Western Australia, for the purpose of applying the information to the development of new mallee areas in New South Wales, particularly the Roto-Enabalong area of 800,000 acres. It was thought that in this way it would be possible to avoid mistakes that had been made in settling other mallee areas and place the investigator in a much better position to make definite recommendations regarding the development of the mallee in New South Wales.

The scope of the investigation was extremely wide, but the time available was comparatively limited. Therefore it was necessary to confine the work to the most important phases of mallee farming and those that would be of most practical use to the State of New South Wales. In addition to discussing the Departmental opinions regarding many of the phases and problems in other States, a special effort was made to obtain the views and inquire into the methods of as many private farmers as possible—the methods of the backward and unsuccessful as well as the successful men. The opinions of local business men and bankers (so far as their activities affected the farmer) were also considered, especially in the newer settled districts.

Practically every phase of wheat production in dry areas was inquired into in the course of this investigation, and it has therefore been thought advisting able to take advantage of the opportunity to discuss the subject in detail one, a later section of this article, not only setting out the results of our "ELEMA" erience in New South Wales in this direction, but also embodying the POULTRY of observation, inquiry and information obtained in the other States. How Suie.

#### The Mallee Timber.

The term mallee is applied to particular types of stunted encalypts of peculiar habit of growth. Typical mallee consists of stunted trees growing in clumps, four or more stems coming from the same clump of roots. As a rule the smaller the diameter of the trees the greater the number occurring in the same clump. In the case of fine whipstick mallee ten to twenty stems may grow from the one base, while in large bull mallee there may be only two or three in the group. The timber generally occurs in these clumps, but interspersed between them may be found single specimens of ironbark, stunted pines, and other timbers, also porcupine bush, &c.

Mallee country usually presents an infertile drought-stricken appearance. The trees afford very little shade, considering the amount of foliage they carry. In the natural state practically no grass grows in the mallee, and on the lighter types of soils no permanent streams are found, due to the fact that the country absorbs water so rapidly. The fact that the mallee areas in their natural state are without grass or water provides sufficient explanation for their avoidance by early settlers, who, of course, greatly preferred the open-timbered country, which was more pleasing, more fertile, better grassed and watered, and easier to handle. It has been found in all States, however, that, in spite of the unpromising and even forbidding appearance of virgin mallee country, it is capable of producing excellent crops of wheat, while after being cropped for a few years quite a satisfactory pasture develops, which improves it wonderfully from a grazing point of view.

#### Types of Mallee.

Different types of mallee are to be found in New South Wales; each type is usually associated with a certain type of soil, but there is much overlapping of types. As a rule, however, the taller and larger diametered mallee is found on the heavier and more fertile types of soil, while the light and sparse mallee usually grows on lighter soils. The following general types of mallee occur:—

Bull Mallee.—This is one of the tallest and stoutest mallees. It usually grows in clumps of three or four trees, but grows to good height—sometimes 20 feet or more. The trees are usually 6 inches or more in diameter, and are therefore very hard to deal with. This type of mallee generally requires a considerable amount of axe work in nicking the trees before they can be successfully rolled. It often occurs on fairly heavy and fertile country, which makes very good wheat land. Land carrying this class of mallee is generally considered excellent wheat country.

Whipstick.—This variety of mallee occurs on a wide range of soils; usually, however, it will be found that on the lighter soils it will only grow to a height of about 8 to 10 feet and be roughly 1 or 2 inches in diameter, while in the heavier and more fertile soils it will grow taller and stouter. In Victoria the term "whipstick" is applied to shorter mallee of the same type.

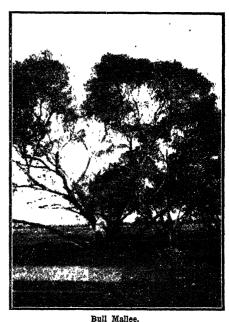
Fine whipstick mallee is usually considered fairly easy to roll and handle. It is generally or good wheat country.

Spar Mallec.—Occurs occasionally, and is often found interspersed in other types of mallee. It consists of single trees about 6 or 7 inches or more in diameter and from 12 to 20 feet or more in height. It is not considered objectionable, and can be easily handled on account of the stumps being single, and therefore not too bulky. When very thick it may need some nicking. The soil is usually excellent where this is found.

Broombush.—This consists of a number of fine-stemmed, narrow-leaved bushes coming from the same root clump. It does not grow to any great height, and is usually about 4 or 6 feet high. It occurs on different types of

In some districts it will be found on good soil while in others it occurs on poor gravelly soils. It is not a reliable indication as to the quality of the soil. It is easy enough to roll, but it suckers very freely. needs a few good stubble burns to subdue it. In this class of country a disc plough does good work, and if set at the correct angle will cut most of the bushes out satisfactorily after the first This scrub contains no large stums (unless mixed with other mallee).

Blue Mallee.—This type grows a little taller than broombrush, and is easily recognisable by the distinctive bluish colour of the foliage. It is the mallee now so extensively used for the extraction of eucalyptus. It generally occurs scattered through broom-



Showing a typical clump of bull mallec. This timber usually grows on heavy soil, which is generally considered to be good wheat country.

brush or other mallee, but may occur by itself. It sometimes occurs on inferior soil, but may also be found on good country.

#### The Soils of the Roto-Euabalong Mallee Area.

The mallee soils of New South Wales compare most favourably with those of the Victorian and South Australian mallee areas. Not only are they slightly better in quality, but they are also more uniform, while there is an

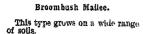
absence of the objectionable sandhills found in other States. In order that a comparison might be made between the soils of the different States, the following analyses and graphs are given. (See pages 486 to 488.)

With the exception of sample No. 6 (see table, page 486), the soils and subsoils of the Roto area fall into a group which is closely akin to the



#### Whipstick Mallee.

The photograph shows with stick maller intersperson with porcuping lash (sometimes called) spinitex).





mallee soils of Victoria and South Australia so far as the mechanical analysis is concerned. In most instances the subsoils are reasonably reten tive.

The chloride content is also satisfactorily low. The reactions varied considerably, soil No. 4 being particularly acid and suggesting a past history of wetter climatic conditions.

The native vegetation and other special features associated with the various samples are as follows:—

Sample 1.—This sample was taken from a site 11½ miles from Euahalong, across the railway line on the north-west track; timber, large mallee (between whipstick and bull), with some spinifex; soil bright red; good country; surface about 8 or 9 inches deep, with fairly retentive subsoil.

Sample 2.—Sample taken near Round Hill on a slight rise. The soil is somewhat sandy; timber whipstick mallee, pine and spinifex; surface soil light in texture, deep red colour, 15 inches deep, then a heavier subsoil, which, although more compacted and lighter in colour, is still rather light in texture. This is one of the nearest approaches to a sand rise, but the soil is quite satisfactory. It is not steep, actually being a gentle undulating rise.

Sample 3.—Taken near the bore at Matakana; timber, small to medium whipstick, spinifex, and some boomi; a nice red loam of light texture, good colour, 12 inches deep, then a thin layer of lighter coloured subsoil which is a little more compacted than the surface, then coming on to a good dark red subsoil which should be fairly retentive.

Sample 4.—Taken 2 mile west of Matakana and 400 yards east of a level crossing (with cattle pits) on the main road on the south side of the railway line. Timber, boomi, whipstick, and spinifex; a nice textured red loam 2 feet or more deep and then merging into a heavier subsoil.

Sample 5.—Taken 4 miles on the road from Matakana to Roto on the north side of the railway line; large whipstick mallee, spinifex, and a trace of boomi; nice red loam, friable, 7 inches deep, then a heavier subsoil, red in colour and fairly retentive; a very nice soil and subsoil.

Sample 6.—Taken south of the line near Roto, 15 miles west of Matakana; carrying belar, wilga and emu bush; the site was surrounded by mallee; surface soil a nice red loam, fairly friable but not loose and fluffy, 7 inches deep, then coming on to a red subsoil with small limestone nodules present, but not in sufficient numbers to render it quite unretentive.

Sample 7.—Taken 1 to 2 miles south of Roto; fairly sparsely timbered with whipstick and spinifex; a nice red light textured loam 8 to 16 inches deep. The subsoil is lighter in colour with some limestone rubble present.

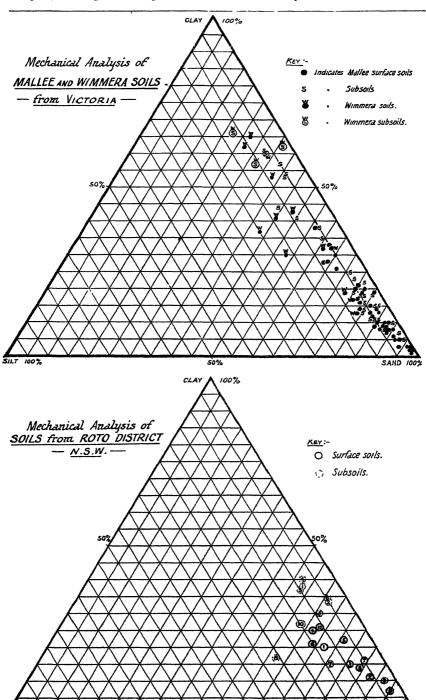
Sample 8.—Taken 1 mile south of the railway line on the One-Eye track; large whipstick mallee, spinifex, and mallee pine; a nice red loam, light textured, but possessing some body when wet, about 14 inches deep, gradually changing at from 9 to 14 inches into a more compacted red subsoil which is quite retentive.

Sample 9.—Taken 1½ miles south of railway line on One-Eye track on a slight sandy rise. Large scattered whipstick and mallee pine, only thinly timbered; a light soil, bright red colour, rather sandy. The surface is 18

MECHANICAL Analyses of Soils from Roto Area, New South Wales.

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Note.—The above smalpes are the nork of Prof. J. A. Preciatt, Wate Research station, pointh dustralia



to 24 inches deep, coming on to a bright red sandy subsoil which is appurently just as sandy as the surface soil. Surface samples taken from first 8 inches, and subsoil samples from a depth of 18 inches to 2 feet.

Sample 10.—Taken 8 miles on One-Eye track, south of railway line. Large whipstick, fairly scattered and open, tending towards bull mallee: a very nice dark red loam, heavier in texture than most of the mallee, excellent soil for 10 inches, then merging into a red, somewhat heavier subsoil which is very retentive; quite good subsoil extending from 10 inches level down to a depth of 2 feet, after which it varies into a lighter-coloured, lighter-textured, somewhat sandier subsoil at 2 feet to 2 feet 3 inches.

To permit of comparison, the mechanical analyses of some Victorian and South Australian soils (supplied by Professor Prescott, of Waite Agricultural Research Institute, S.A.), are shown. The Victorian mallee soils are all noted for low silt content.

MECHANICAL Analyses of Selected Mallee Soils.

Re-calculated to the following International units—ignited mineral fractions only:—Clay, less than '002 mm.; silt, '002 to '02 mm.; fine sand, '02 to '2 mm.; coarso sand, '2 to 2 mm.)

-	-		Soil No.	Clay.	Silt.	Fine Sand.	Coarse Sand.
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79	***		397 ` ′	65	8	12	15
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Red	•••		386 `	32	5	29	34
>7	***		386 (S)	62	2	20	16
27			397	43	9	30	18
,,	****		397 (S)	60	7	21	12
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		1	412	30	5	32	33
		1	469	38	6	32	24
		1	469 (S)	44	12	20	24
		- 1	409	20	3 4	40	37
		. 1	409 (S)	25	4	35	36
		1	466	10	5 6 2 4	55	30
		-	466 (S)	35	6	29	30
		l	475	5	2	48	45
		1	475 (S)	23	1 4	32	41

# Beautify Your Home and Surroundings

FOR the greater part of the year our messages are to direct attention to the value of high-grade Farm Seeds as a means of increased production, but this month is opportune to remind ourselves that some thought and care can well be given to the immediate surroundings of the home.

Many farmers already know the great value of suitably placed shr and shelter trees, well kept hedges, groups here and there of flowering shrubs, and particularly of nicely-assorted fruit trees; others concentrate all efforts on crop production, and fail to realise what comfort and pleasure can be provided at such small expense. Also it must not be forgotten that if ever it is desired to sell out, the improved appearance of the homestead and garden will return many times its cost.

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both Stone Fruits and Citrus.

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both Dwarf varieties and Standard or Tree Shaped

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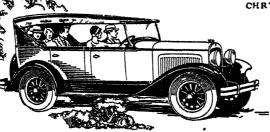
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Меся	HANICAL A	Analyses o	f Selecte	d Mallee	e Soils—	continued.
	Soil No	Clay.	Silt.	Fine Sand.	Coarse Sand,	
		per cent	per cent.	per cent.	per cent.	
		South Aug	stralian M	allee Soils.	•	
	19 52	14	3 7	41 34	51 45	Red sand ridge.
,, Tamana	13 14 16	28 33	0 9 5	54 39 28	43 24 34	Sandy rise. Red loam flat.
Pinaroo	276 279	19 15	1 4	28 28	53 49	
will Duondon	285 291 294	$\begin{bmatrix} 8\\21\\2\end{bmatrix}$	2 4 1	$\begin{array}{c} 37 \\ 33 \\ 45 \end{array}$	53 42 52	Sandy type.
"	297 300	6 2	3	41 33	50 64	Light sand.
" Bookpurnoi	306 ng 310 316	10 13	3 3 5	49 35 31	43 52 51	
" Minderie	322 328 329 (S	16 14 22	6 3 2	30 32 33	48 51 43	
31 27 ·	330 (S	18	0	$\frac{24}{42}$	54 55	
Allen	332 (S 333 (S 337		1 1	35 32 33	61 57 65	
,,	338 (S 339 (S	$\begin{pmatrix} 2 \\ 3 \end{pmatrix}$	1 1	36 39	61 57	
37	343 348 349 (S)	9 17 19	6 6 19	34 31 5	51 46 57	
Borrika	350 (S) 354	18	23 4	6 <b>3</b> 9	53 49	
		New South	Wales M	allee Soils	) <b>.</b>	
	622 623 (S)	13	$\begin{bmatrix} 3 \\ 7 \end{bmatrix}$	36 32	52 48	Rod sand (pines).
,,	626 627 (S)	9	4 4	35 35	54 52	Red brown sand. 8 per cent. CaCO <sub>3</sub> .
,,	628 (S)	11	4	31	54	(mallee). 18 per cent. CaCO <sub>3</sub> .

NOTE:—(S) denotes Subsoil.
\* Hd. denotes "Hundred of."

(To be continued.)

#### FIGURES WHICH SUPPORT THE PRACTICE OF FALLOWING.

Or the total area of wheat harvested for grain in New South Wales in the 1929-30 season (which includes an area of 463,000 acres which entirely failed), 190,800 acres were sown on new land, 1,638,700 acres on fallowed land, and the balance, 2,072,700 acres on stubble, the respective productions of grain being 5.1 bushels, 10.8 bushels, and 7.3 bushels per acre.

#### Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Guzette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36A, G.P.O., Sydney, not later than the 12th of the month.

Wheat—			
Clarendon	•••		. C. F. T. Anderson, "Swan Vale," via Glen Innes.
Cleveland	•••		. W. Burns, "Goongirwarrie," Carcoar.
Marshall's I	No. 3		. G. W. Forsyth, "Glencoe," Wallendbeen.
			F. Bauer, Bribbaree.
Nizam			. A. D. Dunkley, "Bon Loa," Tyagong, via Grenfell.
Queen Fan	•••		. C. F. T. Anderson, "Swan Vale," via Glen Innes.
Turvey	•••		. F. Odewahn, Culcairn.
Waratah	•••		. Manager, Experiment Farm, Trangie.
			E. H. K. King, "Karrindee," Uranquinty.
			C. F. T. Anderson, "Swan Vale," Glen Innes.
Maize-			
Large Goldi	nine	•••	. P. Short, "Moore Park," Armidale.
Onions-	TT		
Improved			
Brown	pani	sn	. S. Redgrove, "Sandhills," Branxton.
	er Eav	er Whit	S. Redgrove, "Sandhills," Branxton.
	River	Brown	
Spanisl	1		. C. J. Roweliffe, Old Dubbo Road, Dubbo.
¥37			
Watermelon-			71 T T3 3100 CTT 11 11 by 1 m 12
Angelino	***	•••	. C. J. Roweliffe, Old Dubbo Road, Dukko.

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

#### INFECTIOUS DISEASES REPORTED IN MAY.

THE following outbreaks of the more important infectious diseases were reported during the month of May, 1930 :---

Anthrax					Nil.
Blackleg					7,1
Piroplasmosis (tick fever)		***	•••	• • •	Nil.
Pleuro-pneumonia contagiosa	•••	•••	•••	***	1411.
Swine fever	•••	•••	***	•••	Nil.
Contagious pneumonia	•••	•••	***	•••	NII.
Contragious pheumoma					Nii.

-MAX HENRY, Chief Veterinary Surgeon.

#### Fallowing Competitions, 1929-30.

SUMMARISED REPORTS FROM VARIOUS DISTRICTS.

#### Western District (Dubbo Centre).

B. M. ARTHUR, H.D.A., Senior Agricultural Instructor.

DURING 1930, fallow competitions were conducted by the Pastoral, Agricultural, and Horticultural Associations of Narromine (thirteen entries), Dubbo (twenty-four), and Cumnock (nine), making a total of forty-six entries.

These three associations consistently give support to these annual competitions, as they recognise in them one of the best means of educating the farmers in the finer points of soil preparation. Moreover, the majority of the competitors enter mainly with the object of having their work discussed and criticised, so as to be better prepared for future operations.

The Season.
The rainfall recorded at the various centres was as follows:—

		Cumnock.	Dubbo.	Narromine.
1929.		points.	points.	points.
July	•••	 24	73	60
August	***	 160	119	77
September		 93	72	60
October		125	214	213
November		270	130	104
December 1930.	•••	 187	83	104
January		 228	538	295
February		 99	23	33
March	•••	 122	90	25
Totals		 1,308	1,342	971

Adverse seasonal conditions during the winter of 1929 were not conducive to the early ploughing or preparation of fallows, mainly because sheep feed was scarce, and farmers did not like to sacrifice what little grazing there was to be found on stubble paddocks. Horse feed also was in many cases very depleted, or had been used up in sowing the crop after the poor harvest of 1928-29. Consequently most fallows were not commenced until August or early spring, and in several cases comprised areas which had been sown to crop that year, germinated patchily, were fed off and worked up again in the late spring or early summer.

Fair rains during November and December made it possible to give fallows their first working and to conserve some moisture. This was followed by excellent soaking rains late in January, which penetrated well down in the majority of fallowed areas and allowed them to be worked under ideal conditions. Scattered thunderstorms during February and March favoured some centres more than others, Narromine district being particularly unfortunate in this respect. Weed growth was not trouble-some, and what growth did appear was easily kept in check.

#### The Cumnock Competition.

This competition was judged during mid-March. Fallows averaged slightly over three workings, excluding the ploughing. Weed growth was light, but was not under complete control, and couch grass was noticed on several of the areas. This grass is severe on soil moisture reserves and should be controlled as far as possible.

First place was awarded to Mr. G. C. Watt, of "Fairymount," Baldry, who has been a consistent competitor, and he well merited his win with improved methods of preparation. His point score was 140. The soil varies from a chocolate to grey clay crumbly loam of a self-mulching nature. It was mouldboard ploughed 4 inches deep in August, disced in November and February, and springtoothed in March. Mulch and consolidation were even and firm, and moisture content was very good.

Two newcomers to fallow competitions in Messrs. P. K. Reilly and D. W. O'Brien occupied second and third positions, with 139 and 138 points respectively, and their fallows had been well worked, and should give good results.

#### The Dubbo Competition.

A record entry of twenty-four was received for this competition, which was very keen, only twelve points separating the first and last entries. Moisture content was generally high and well held as a result of the big January rains. Many of the competitors have a good working knowledge of the requirements of a suitable fallow and seed-bed, and worked towards that objective. Most of that essential knowledge has been gained from entries in previous fallow competitions. Workings, excluding original ploughing, averaged four. Several fallows were not ploughed, but worked up with the springtooth cultivator or scarifier.

Mr. N. H. Hubbard, of "The Wilgas," Wongarbon, who occupied third place last year, produced the winning fallow this year, with a total score of 141 points. The soil is a chocolate basalt self-mulching heavy clay loam, which was springtoothed mid-March, 1929, with narrow points, crossed in June, and received six further workings with the same implement or harrows. Moisture content was high, while the mulch showed slight variation, due to tractor working; cleanliness was good, and compactness excellent. It was nearly a perfect fallow, produced by a keen student of soil and crop requirements.

Mr. J. Bourke, of Wongarbon, was a close second on a similar type of soil, which was mouldboard ploughed in July and worked four times. His point score was 140.

Mr. J. MacCullagh, of "Oakdene," was third with 139 points, on a heavy clay black pug soil, which was disc ploughed in June and worked three times. The fallow exhibited was weed free, with good moisture content, while the mulch and compactness were suitable.

#### The Narromine Competition.

Narromine again conducted a competition in spite of bad seasons and almost a total crop failure in 1929. Many of the fallows exhibited had been sown during 1929, but were fed off and worked up again for this year. Rainfall in January was lighter around this district, except on the northern side of the river, than in other districts, and farmers were unfortunate in missing most of the February and March thunderstorms.

Judging took place during mid-March. The average number of workings was only slightly over two, excluding ploughing.

Mr. R. A. Harricks, of "Horse Shoe Vale," was awarded first and second positions with two entries. He was more fortunate than others in obtaining more rain in January, but the working of his somewhat difficult type of soil to obtain even consolidation and depth of mulch was particularly meritorious, and the win was thoroughly deserved. The soil is a medium red to grey clay loam with a stiff clay subsoil, and contains occasional black gilgai patches. It was a springtooth fallow commenced in September and worked four times with the same implement and harrows. Moisture content was very good, mulch and compactness good for such a variable soil, but presence of weeds was responsible for the loss of a few points. The points scored totalled 140.

Mr. J. Maynard, of "Willydah," Mungeribar, was third with 137 points on a fallow worked mostly with a rigid type scarifier, and commenced in February, 1929.

#### Comments.

The general standard of farming in this portion of the western district is improving every year, brought about mainly by bitter experience of crop failures on poorly prepared seed-heds, but also helped considerably by means of fallowing competitions and the publicity given to the results.

Much has yet to be learned of the close relationship between depth and evenness of mulch, and consolidation; the difference between a mellow and a harsh surface soil condition; and the necessity for sowing the seed onto a firm seed-bed to ensure an even germination and a firm root-hold for the wheat plant. These essential factors have much to do with the production of a successful crop should dry spring conditions prevails, which is frequently the case.

Weed growth, particularly stink grass, couch grass, melons, Mexican poppies, thistles of various sorts, burrs and wild oats, should be kept well in hand, as they all cause more or less drain on soil moisture and available plant foods. If caught in time, none of them presents insurmountable difficulties in control measures.

More attention is required in many instances to the condition of headlands, and finishes. Bad finish-outs are a frequent source of soil erosion, and much valuable ground is often wasted on headlands, which then become suitable harbours for weeds and plant diseases.

#### Western District (Parkes Centre).

H. BARTLETT, H.D.A., Senior Agricultural Instructor.

During the period 1929-30, fallow competitions were promoted by the Pastoral, Agricultural, and Horticultural Associations at Parkes (seven competitors), Condobolin (eight), Forbes (five), Bogan Gate (eight), Trundle (five), and branches of the Agricultural Bureau at Gunning Gap (ten), Filli-fogi (sixteen competitors), making a total of seven competitions and fifty-nine competitors.

The Agricultural Bureau competitions were associated with field-day demonstrations and fallow judging contests.

The Season.

The rainfall recorded as the various centres was as follows:—

			Parkes.	Bogan Gate.	Condobolin
1929.			points.	points.	points.
June	•••	•••	97	94	70
July	•••	•••	27	25	40
August			219	148	247
September			132	94	147
October	•••	•••	66	84	125
November	•••	•••	126	23	73
December 1930.	•••	•••	327	269	155
January	•••		60	Nil.	<b>3</b> 8
February	***	***	65	6	7
March	•••	•••	69	75	53
		-	1,188	818	955

For the past two years the monthly rainfall has, with four exceptions, been below the average, and the aggregate shortage reaches a very considerable amount. The records at Parkes show an average annual rainfall of 20.92 inches, but the rainfall for the two-year period April, 1928, to March, 1930, amounted to 25.78 inches, showing a shortage of 16.06 inches. Such a shortage, and the absence of substantial and penetrating rains during the two years, have left the soils and subsoils with very little carry-over moisture for the 1930 wheat crop. They have also upset farming systems. Pasture and stubble land have been at a premium for eighteen months past, and as farmers could not afford to turn under anything edible, there has been general delay in ploughing for fallowing, and a reduction in the area fallowed.

As an offset against the reduced area fallowed, many of the failed areas of 1929 were worked early, and will be of almost equal value. During the past nine months there has really only been two rains which justified fallow working—those in August and December—except in a few localities where thunderstorms were registered. The December rains were general, and penetrated to a depth of fifteen inches, and though the surface soils, to a depth of six inches, were dry at judging time (early April) a moist strata from six to fifteen inches was generally noticeable; from fifteen inches downwards a gradual mergence into dry soil was apparent.

For the three months, January to March, the light showers were not of any service, and fallows lacked the finish which competition blocks are expected to possess.

The following table shows the awards in each competition:-

			First.		Second.	Fhird.			
P., A., and tions. —	l H. Ass	ocia-				i.			
Parkes	•••				G. Quinn (130				
Condobolin			A. Heinrich (	35	points). L. J. Mathews (134	W. O'Halloran (129			
Forbes			R. E. Edwards (	33	points). J. Rawsthorne (131	A. G. Minter (124			
Bogan Gate			Dwyer Bros.	23	points). W. Scott (121	K. B. Rawson (120			
Trundle		•••	A. Willmott (I	20	points). A. W. Mill and K. Gault (119 points).	Pouros).			
Agriculture Branche		u	Pomo).		Gadio (113 pomos).				
Gunning Gap					W. Scott (121				
Filli-fogi	•••	•••	R. B. Green (	21	points). A. H. Capell (119 points).	points). E. C. Beuzeville (117 points).			

TABLE of Awards.

#### General Comments.

There was a marked deficiency in the soil and subsoil moisture throughout the district, and this, expressed in common terms, was probably equivalent to four or five inches of rainfall below the maximum quantity desired in the fallows. It seems, if an average crop is to be produced, that a rainfall of ten inches during the growing period will be necessary. A greater rainfall will produce exceptionally heavy yielding crops, as material for plant food—after two lean years—should be present in abundance.

The chocolate to black clay loam soils of the self-mulching type proved to be exceptionally dry, and little or no moisture was present to a depth of twenty inches. Although suitable mulches had been maintained, deep, wide cracks had developed, and many inches of rain will be required before the ground closes again.

A fine example of opportune cultivation was demonstrated on Messrs. Dwyer brothers property at Gunning Gap. Immediately following light rains early in June, the ploughing of one paddock was commenced, but it was not completed until two weeks later. The early ploughed portion broke up into a moist, friable condition, but the later portion was somewhat hard and dry. This difference in texture persisted throughout the fallow period, and was most noticeable at judging time. Such a demonstration supports the advice—plough early, but, above all, endeavour to plough when the soil is in a moist condition.

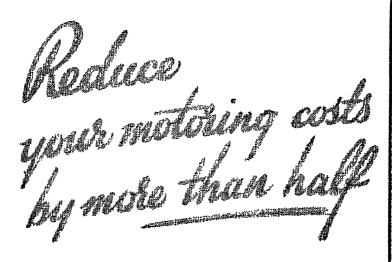
#### North-western District.

#### J. A. G'REILLY, H.D.A., Agricultural Instructor.

Three agricultural associations in the north-west conducted fallow competitions this season, viz., Wee Waa, Narrabri, and Gunnedah, and despite the comparatively low rainfall from December till March, the leading fallows were in exceptionally good condition. At Wee Waa six entries were received, which, for an initial effort, was very creditable; all were short summer fallows. The competition at Narrabri attracted eight entries, three winter and five short summer fallows. A feature of the Gunnedah competition was that out of the seven entries submitted, five were winter fallows. It is evident that the farmers in this section of the district are recognising the advantages of occasionally fallowing their land.

The wheat growers in the north-west base their fallowing operations on the rainfall in the period from November to March, and in a normal season by early ploughing after the crop is harvested, a large proportion of these summer rains is conserved for the subsequent crop. The rainfall during last summer and the previous one was somewhat below the average, and growers are turning their attention to a greater conservation of moisture by introducing a winter fallow into their cropping system. For the present season, crops sown on long fallow will have a decided advantage over those sown on short summer fallow. It is not recommended that the whole of the cropping area be fallowed each year, but farmers should so arrange their farming operations that at least one third of their crop will be sown on winter fallow each year.

The introduction of oats into the cropping system is an advantage. It is sown on stubble country and grazed through, so as to enable the land to be ploughed before harvest. In view of the summer rains generally experienced in the district, this system of working is likely to become popular. In a normal summer season the moisture conserved in this type of fallow is abundant, and the practice exercises an excellent control over black oats and fungous diseases. By growing a crop of oats for grazing purposes during the preceding year there is a better likelihood of germination of flag smut spores in the soil than there would be in the case of a bare fallow.



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#### The Season.

The earliest serviceable fall of rain during the fallowing period was at the end of January, 1930. This added to the reserve of moisture in fallowed land and enabled the initial working to be given to stubble land. It was of a stormy nature and some sections of the district benefited more than others. February was a dry month generally in the district, but most parts participated in falls which occurred about the middle of March and early in April. The incidence of the rain and resultant weed growth did not occasion a great deal of working on the short fallows. Winter fallows were worked after each useful rain.

The average number of workings that the fallows received was:—Wee Waa, 2.5; Narrabri, 4.2; Gunnedah, 4.4.

The rainfall at the various centres was:-

#### RAINFALL Table.

	Wee Waa P.O.	Wee Waa (E. Kelly).	Culgoora (S. Car- berry).	Gunnedah (Pownell Bros.)	Gunnedah (Norrie Bros.).	Gunnedah P.O.	Narrabri P.O.
1929.	points.	points.	points.	points.	points.	points.	points.
June	 117		•	55	*	57	181
July	 61		•••	40	•••	76	107
August	 80		•••	188	•••	190	149
September	 69		***	164		97	118
October	 8 <b>2</b>		•••	157		84	225
November	 •••		***	140	•••	195	***
December 1930.	 •••	•••	•••	70	•••	61	•••
January	 283	318	400	465	375	299	333
February	 17			13	17	45	22
<b>M</b> arch	 273	248	160	164	139	64	286
Total	 •••	566	560	642	531	408	•••

The Leading Fallows.

The Wee Waa Competition.—Mr. T. Underwood, "Wire Lagoon," Wee Waa, secured first place, with a well-prepared short fallow on a medium to heavy clay loam (dark), with self-mulching tendencies. The land was eropped with wheat last season, and after a good burn was mouldboard ploughed about the middle of December, 1929. The fallow was harrowed in January and twice in March. The amount of moisture conserved in the subsoil was amazing, and was well up to the surface of the consolidation. The mulch was of good texture and uniform in depth, and the fallow was particularly free from weed growth.

Mr. D. Russell, "Lowana," Wee Waa, secured second place, with an entry of a brownish loam, the subsoil of which was mostly a good distance from the surface. The initial working was done with the sundercut at the end of January, and the fallow was worked with the springtooth in March. The mulch was shallow in places, but the moisture was fairly abundant in the subsoil and well up in the consolidation.

Third prize went to Mr. T. Sweetman, "Wynella," Wee Waa. The soid consisted of a medium to sandy loam (red), which was cropped last year.

It was sundercut at the end of January, 1930, and springtoothed middle of March. The mulch was in good physical condition, but variable in depth; moisture was good in the subsoil, but was not uniform in the seedbed.

The Narrabri Competition.—Mr. W. McCutcheou, "Ciamaltha," Narribri, divided first place with Mr. S. Carberry, of Culgoora.

The former's fallow was a well-prepared chocolate loam which had been out in pasture for some time. The land was disc ploughed in June, 1929, and stocked till January, 1930, when it was springtoothed; it was harrowed three times in March. The fallow was well supplied with moisture, both in the subsoil and the seed-bed. The mulch was in good condition, but somewhat shallow in places.

Mr. S. Carberry, "Cadarga," Culgoora, entered a well-prepared fallow, which indicated clearly the advantages of early preparation of a short summer fallow. The soil consists of a free-working greyish to black loam. After a good burn in December, 1929, the land was worked with the springtooth; it was harrowed in March, and springtoothed early in April. There was an abundance of moisture in this fallow, and the consolidation was excellent. The mulch varied slightly in depth.

Mr. N. Barrett, "Yera," Edgeroi, was placed third with a fallow on a red to chocolate loam overlying a retentive class of subsoil. The land was cropped last season and was worked with the rigid scarifier in January and harrowed twice in March. The fallow was in good condition but moisture was uneven in the subsoil. A good mulch overlying a well compacted seed-bed.

Gunnedah Competition.—Mr. F. Adams, "Collybee," Gunnedah, won this competition with a particularly good class of fallow on a dark chocolate loam. The last crop was in 1925. The land was sundercut in November, 1929, harrowed once in December and twice in January, springtoothed February, harrowed in March, springtoothed and harrowed in April. The supply of moisture was excellent both in the subsoil and seed-bed. The mulch was in good condition, but varied slightly in depth. The consolidation was good, and the fallow was very free from weed growth.

Mr. F. Foster, "Garnock," Gunnedah, was second. His entry consisted of a greyish to chocolate loam overlying a good class of subsoil. The land was cropped with wheat in 1928; portion was disc ploughed and portion sundercut in September, 1929; springtoothed January, 1930, harrowed February, springtoothed March, and harrowed in April. The moisture was plentiful in the subsoil and sed-bed. The mulch varied in depth, but consolidation was firm and fine.

Third prize went to Norrie brothers, of "Strathmore," Gunnedah. This fallow was prepared on country that had grown a crop of cats for grazing purposes the previous season. The soil consists of a red to chocolate loam. Sundercut October, springtoothed December and March. This fallow scored well under most headings, but would have been improved by an extra working with springtooth or harrow.

#### Varieties of Maize.

### DEPARTMENTAL RECOMMENDATIONS FOR DIFFERENT DISTRICTS.

L. S. HARRISON, Special Agricultural Instructor.

The following varieties of maize are recommended by the Department for planting in the various maize-growing districts of the State. Growers are reminded to make early arrangements for seed supplies, and if in doubt as to which variety to sow, to communicate with the Department.

#### APPROXIMATE ORDER OF MATURITY OF VARIETIES RECOM-MENDED.

Very Early.—Early Morn, Golden Glow.

Early.—Wellingrove, Golden Superb, Kennedy, Iowa Silvermine, Funk's Yellow Dent, Iowa Goldmine, Goldmine Crossbred.

Midseason.—Boone County White, Hickory King, Leaming, Golden Nugget, Early Clarence, Golden Beauty, Murrumbidgee White, Manning Silvermine.

Late.—Yellow Hogan, Fitzroy, Large Red Hogan, Ulmarra Whitecap, Pride of Hawkesbury.

#### VARIETIES RECOMMMENDED FOR GRAIN.

UPPER NORTH COAST.

(a) Tweed River.

Early Crop.—Leaming, Iowa Silvermine.

Main Crop.—Fitzroy, Ulmarra Whitecap, Large Red Hogan (for early sowing only).

(b) Lower Richmond River.

Early Crop.—Hickory King (second-class soils only), Leaming. Main Crop.—Golden Nugget (second-class soils only), Fitzroy.

(c) Upper Richmond River.

Early Crop.—Leaming.

Main Crop.—Fitzroy, Large Red Hogan, Ulmarra Whitecap.

(d) Clarence River.

Early Crop.—Leaming.

Main Crop.—Fitzroy, Ulmarra Whitecap.

Second-class Soils.—Golden Nugget, Hickory King.

(e) Bellinger River.

Early Crop.—Leaming, Golden Superb, Iowa Silvermine.

Main Crop.-Fitzroy, Ulmarra Whitecap.

NORTH COAST TABLELAND.

Dorrigo and Comboune Districts.

Main Crop.—Leaming, Golden Superb.

#### MIDDLE NORTH COAST.

#### (a) Nambucca River.

Early Crop.—Golden Superb, Leaming, Hickory King, Manning Silvermine.

Main Crop.—Fitzroy, Yellow Hogan.

#### (b) Lower Macleay River.

Early Crop.—Golden Superb.

Main Grop.—Fitzroy, Large Red Hogan, Yellow Hogan, Golden Beauty, Pride of Hawkesbury, Leaming.

#### (c) Upper Macleay River.

Early Crop.—Golden Superb, Funk's Yellow Dent.

Main Crop.—Large Red Hogan, Fitzroy, Yellow Hogan, Learning, Golden Beauty, Hickory King, Giant White.

#### (d) Hastings River.

Early Crop.—Funk's Yellow Dent, Golden Superb.

Main Crop.—Fitzroy, Large Red Hogan, Golden Beauty, Golden Nugget, Leaming, Hickory King, Manning Silvermine.

#### (e) Lower Manning River.

Early Crop.—Funk's Yellow Dent, Golden Superb.

Main Crop.—Fitzroy, Large Red Hogan, Pride of Hawkesbury, Learning, Golden Beauty, Manning Silvermine, Hickory King.

#### (f) Upper Manning River.

Early Crop.—Golden Superb, Funk's Yellow Dent.

Main Crop.—Fitzroy, Leaming, Golden Beauty, Manning Silvermine, Hickory King.

#### CENTRAL COAST.

#### (a) Lower Hunter River.

Early Crop.—Funk's Yellow Dent, Golden Superb.

Main Crop.—Large Red Hogan, Fitzroy, Leaming.

#### (b) Hawkesbury River.

Early Crop.—Golden Superb.

Main Crop.—Large Red Hogan, Fitzroy, Yellow Hogan, Leaming, Manning Silvermine.

#### (c) County Cumberland.

Early Crop.—Hickory King.

Main Crop.—Fitzroy.

#### SOUTH COAST.

#### (a) Illawarra District.

Early Crop.—Funk's Yellow Dent, Iowa Goldmine, Iowa Silvermine.

Main Crop.—Large Red Hogan, Fitzroy, Yellow Hogan, Boone County White.

#### (b) Shoalhaven River.

Early Crop.—Funk's Yellow Dent.

Main Crop.—Leaming, Funk's Yellow Dent, Fitzroy, Boone County White.

#### (c) Milton District.

Early Crop.—Funk's Yellow Dent, Iowa Goldmine, Iowa Silvermine.

Main Crop.—Fitzroy, Large Red Hogan, Leaming.

#### (d) Moruya River.

Early Crop.—Funk's Yellow Dent, Early Morn.

Main Crop.-Large Red Hogan, Fitzroy.

#### (e) Bega and Pambula Rivers.

Early Crop.—Funk's Yellow Dent, Iowa Goldmine, Iowa Silvermine.

Main Crop.—Large Red Hogan, Golden Beauty, Yellow Hogan, Hickory King, Boone County White.

#### NORTHERN TABLELAND.

#### (a) Tenterfield District.

Funk's Yellow Dent, Golden Glow, Iowa Silvermine, Hickory King, Wellingrove.

#### (b) Glen Innes District.

Strong Soils.—Wellingrove, Iowa Goldmine, Goldmine Crossbred. Light Soils.—Wellingrove, Iowa Silvermine.

(c) Ben Lomond, Llangothlin, Guyra and Black Mountain Districts. Early Morn, Golden Glow.

#### (d) Armidale District.

Wellingrove, Funk's Yellow Dent, Golden Glow, Golden Superb.

#### (e) Uralla District.

Wellingrove, Early Morn.

#### CENTRAL TABLELAND.

#### (a) Bathurst District.

Alluvial Soils.—Funk's Yellow Dent, Iowa Silvermine. Upland Soils.—Iowa Silvermine.

#### (b) Colder Districts.

Early Morn.

SOUTHERN TABLELAND.

Moss Vale District.

Golden Glow.

#### NORTH-WESTERN SLOPES.

(a) Inverell District.

Heavy Soils.—Funk's Yellow Dent, Kennedy, Auburn Vale, Funk's 90-day Light Soils.—Wellingrove, Iowa Silvermine. Late Sowing.—Early Morn, Golden Glow.

(b) Tamworth and Upper Hunter Districts. Alluvial Soils.—Funk's Yellow Dent, Iowa Silvermine.

CENTRAL-WESTERN SLOPES.

Alluvial Soils.—Funk's Yellow Dent, Iowa Silvermine. Upland Soils.—Iowa Silvermine, Early Morn.

South-Western Slopes.

(a) Tumut River.

Rich Alluvial Flats.—Main Crop (October sowing), Early Clarence, Murrumbidgee White; Early Crop (late sowing), Funk's Yellow Dent. Second-class Alluvials.—Funk's Yellow Dent, Iowa Silvermine.

(b) Murrumbidgee River (Gundagai District). Funk's Yellow Dent, Iowa Silvermine, Golden Glow.

MURRUMBIDGEE IRRIGATION AREAS.

Funk's Yellow Dent, Iowa Silvermine.

#### VARIETIES RECOMMENDED FOR GREEN FODDER.

COASTAL DISTRICTS.

Early Varieties.—Hickory King, Leaming. Late Varieties .- Fitzroy, Pride of Hawkesbury, Ulmarra Whitecap.

TABLELAND DISTRICTS.

For Warmer Districts.—Fitzroy.

For Cooler Districts.—Hickory King, Leaming.

For Coldest Districts.—Wellingrove.

WESTERN SLOPES AND MURRUMBIDGEE IRRIGATION AREAS. Fitzroy.

#### Early Tomato Trials on the Coast.

VARIETY AND MANURIAL EXPERIMENTS.

J. DOUGLASS, H.D.A., H.D.D., Agricultural Instructor.

DURING the past season trials were conducted in the main tomato-growing districts of the State, the chief aim being to ascertain the most profitable variety to grow under the conditions prevailing in each district. In the mid-coastal districts the ideal tomato is one that is early maturing and of good shape and quality, while on the far North Coast a variety is required that is able to thrive under semi-tropical conditions and an abundance of rain, and, owing to the distance from market, tomatoes grown in these districts must be good carriers. Districts west of the dividing range have a dry, burning climate, and a great difficulty is experienced in growing early tomatoes owing to sun-scald, &c.

A trial was also conducted under glass-house conditions with the object of gaining reliable data as to the suitability of different varieties, and Mr. Eastwood, of Tascott, co-operated with the Department in testing out fusarium wilt resisting varieties in old tomato ground. The results of these trials are summarised in this report and make available a good deal of information previously unknown.

#### The Season.

The season generally was a very bad one for early tomato-growers. Little difficulty was experienced in germinating the seed in May and June, but at transplanting time (usually early July) many growers lost the whole of their seedlings owing to "damping off" and cold conditions. Growers should realise that the first transplanting of seedlings is a delicate operation and calls for special care. The seedlings are actually removed from ideal hot-bed conditions to hardening-off frames in a very short space of time. The most common mistakes are to over-water the seedlings, and to plant them too deep at transplanting time. Both these mistakes cause a distinct chilling off and shock to the plants to their detriment.

The spring could be described as a late one, the soil taking longer than usual to warm up, resulting in slow plant growth. During October practically the whole of the tomato and potato crops on the coast were attacked by Irish Blight. Many tomato crops were totally destroyed. This epidemic was followed up by plagues of grubs, the larvae of the potato moth and the cob tip maize moth. These grubs were found in every district of the State, reports coming from as far west as Lake Cargelligo that great damage had been done to the crops by these insects. A little forethought on the growers' part would have saved many crops from Irish Blight or the caterpillars. Regular sprayings with Bordeaux mixture, as

recommended by the Department, will definitely prevent the spread of Irish Blight, and a poison spray such as arsenate of lead, if used when the grubs are first noticed on the leaves and before they enter the tomato fruit, will control the grubs.

This year, time would not permit of the calculation of the monetary values of tomato varieties. Early tomatoes are always more valuable than late ones, hence a heavy yielding variety may not necessarily be the most profitable.

#### The Variety Trials.

W. T. Brown, Cardiff.—The soil on this farm is, in the main, loam of medium fertility, strewn with pebbles. The seed was sown in frames on 4th June, 1929, an excellent germination resulting. The seedlings were thinned out, and later transplanted into the field on 7th August. Cold nights were experienced during August and September, greatly checking the growth of the plants.

During the growing period Marvellosa, Marvana, Atlantic Pride, and Bonny Best were outstanding. Atlantic Pride is an improved Chinese type, being exceptionally early and a heavy bearer.

Picking commenced early in November. The total yields proved that Marvana was the best yielder for the season. This variety is a comparatively late maturer and not to be compared with other varieties in a normal year. Being a fusarium wilt resisting type it has a robust constitution and is admirably suited for old tomato land. The fruit is of excellent shape, being slightly flattened and of medium size.

Atlantic Pride produced the heaviest yield during November and the second heaviest total. The quality of this fruit varies a good deal, and does not compare with Bonny Best. Sunnybrook Earliana showed up well in the early and total yields. The picking season was cut short owing to falling prices and hot weather, hence the yields cannot be taken as average ones.

Mr. Edwards, Bonnyrigg.—This grower is situated in close proximity to Mr. Johnson's farm in the Liverpool district. The soil is yellowish, red clay, typical of a great deal of the district. The plants for the trial were supplied by Mr. Johnson. Unfortunately Earliana was not included. A new variety, Dramone Favourite, produced the heaviest yield and showed great promise, but further trials will be conducted before this variety can be recommended. Bonny Best was slightly earlier than Dramone Favourite and yielded exceptionally well. Marvana showed out to advantage against Marvellosa, being much earlier in this district, and a heavier cropper.

N. K. S. McCallum, Coorabell Creek.—This grower is in the Byron Bay district, and in a situation with very similar conditions to the average North Coast tomato grower. The winters are very mild, the rainfall very heavy, and the soil a typical light volcanic loam. The seed was planted about 22nd April, and picking commenced during October.

The crop was pruned and grown on stakes in the usual way, which allows the plants to dry rapidly under coastal conditions. Pruning naturally decreases the area of leaf and the proportion of top growth to roots. Plant food in the form of starch is naturally stored in the top growth; the storage of excess plant food in the reduced leaf area causes the leaf to become very thickened, brittle, and slightly curled. Many growers mistake this condition for some virus trouble; it usually indicates excellent growing conditions, or excessing manuring with nitrogenous manures. This trouble was particularly noticeable at Coorabell Creek, and is a very common condition in staked tomatoes on the North Coast.

Bonny Best proved to be the earliest and heaviest yielding variety under local conditions. This variety is universally suited to every district in New South Wales, and is now well known. Denisonia and Bowen Buckeye, two Queensland varieties, did not compare with Bonny Best this season. Bowen Buckeye has proved a failure in other districts in New South Wales. The New South Wales Department of Agriculture's selection of Marglobe proved superior to a Queensland selection; both, however, are worthy of further trial.

#### An Experiment with Fusarium Wilt Resisting Varieties.

H. Eastwood, Tascott.—This grower has in the past experienced heavy losses through fusarium wilt, the spores of which are soil and seed borne. It was therefore decided to conduct an experiment with varieties to determine their resistance to this disease. Marglobe, which had in the previous season proved to be very resistant to the disease, was included in the variety trials, and used as a standard variety in the manurial experiments. Other varieties included were Marvana, Marvellosa, Bonny Best, Earliana, and Chalk's Early Jewel. The two first-mentioned varieties are known to be wilt-resistant, and the other three varieties were tested out with the object of noting their growth under the prevailing conditions. Mr. Eastwood grew Chalk's Early Jewel as a standard variety for some years with outstanding results; the past crop was grown from seed from a single plant showing resistance to fusarium during the previous year.

The soil on this farm is light, sandy loam, very deficient in organic matter. With the advent of hot weather fusarium makes rapid progress, and non-resistant varieties are quickly destroyed. This was the case this year with the Bonny Best, Earliana, and Chalk's Early Jewel. It might be pointed out, however, that Bonny Best, a very strong-growing type, set and ripened a fair quantity of excellent fruit before dying off.

Of the resistant varieties Marglobe produced the heaviest total yield; all three proved very resistant to the disease, and their growth was of great interest.

Marvana is a relatively new variety and was in every way superior to Marvellosa under Tascott conditions. The leaf and vine growth of Marvana very closely resemble that of Bonny Best, being medium heavy and very robust. The fruit is borne in very compact bunches, is medium in size,

and inclined to be flattened. This last feature makes it an easy variety The individual fruit turn yellow before ripening to a real colour; this characteristic is a distinct advantage, particularly when fruit has to travel a long distance to market. The flesh is thick and of good quality, the core is small, and the skin tough.

Marvellosa.—Did not yield as well as Marvana in the experiments, but is worthy of more extensive trials. This variety is very heavy and robust in the leaf and stem growth and very closely resembles Marglobe. The fruits also closely resemble Marglobe, except that they are distinctly pink in colour. The fruit is borne in long clusters, being set roughly in two rows as in the Bonny Best variety.

Marglobe.—This variety is now becoming better known. It has been proved conclusively to be resistant to fusarium under Australian conditions. At Tascott, Marglobe is an exceptionally heavy bearer, but is



Marglobe Resists Fusarium Wilt. On right 'Sunnybrook Earliena infected with fusarium wilt. On left: Marglob resistance. The soil in both cases received exactly the same treatment. On left: Marglobe showing

inclined to be late maturing when compared with the Earliana types. Another very outstanding disadvantage from a marketing point of view is the size of the fruit. The bottom two bunches produce fruit averaging over 1 lb. in weight, which are too large for the early market. By selection Mr. Eastwood has greatly reduced the size of the core, and hence the tendency to crack in this variety. All growers on old tomato land can be definitely recommended to try Marglobe as a second early variety.

Fusarium wilt has spread very rapidly in New South Wales during the past few years, and on the lighter soils has put many people out of tomato-growing. The results of experiments such as this will be of valuable assistance to farmers whose soil is infected with this fungous trouble.

# YIELDS of Tomato Variety Trials, 1929-30.

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#### Manurial Trials.

Past experience and experiments have proved that up to date M 22, a mixture of bonedust and superphosphate, is the fertiliser that gives the best results with the tomato crop in New South Wales. This fertiliser is usually applied to the soil just previous to transplanting the seedlings to the field. It has been thought that, particularly in light soils, crops producing a heavy picking of fruit over a comparatively long period, require another application of plant food during the growing period. The writer has recommended the application of P 11 to the late crops as a top-dressing, and where this has been done the results have been remarkable. This may be due in some degree to the cold weather preventing the soil bacteria from working.

An experiment to test out top-dressings was carried out at Macquarie Fields with Messrs. Kershaw and Sorby, and Mr. H. Eastwood, of Tascott, co-operated with the Department in conducting a simple manurial trial as well as a top-dressing trial. Unfortunately the yields of the top-dressing trial, which also included a plot dressed with ferris sulphate, were not suitable for publication.

H. Eastwood, Tascott.—The season was a cold one for the early tomatoes, hence the results cannot be taken as conclusive. The variety used in this trial was Marglobe, the seedlings being transplanted into the field on 18th August.

The soil at Tascott is very light sand. The cultural work on this farm cannot be improved upon, so that excellent results are always obtained from manuring.

The results indicate that all manurial mixtures were profitable when compared with the unmanured plot. An outstanding feature of this trial, and one that has never occurred before, is that the application of potasa actually produced results. The two plots producing the heaviest yield in the first month of picking, viz., P 13 and H.A.C. mixture, both contained sulphate of potash. This can easily be explained when it is known that the season was rainy, cold, and the spring was late. The plot is just above sea level, and is not considered early for the district. Results of manurial trials conducted at Rothamstead Experiment Station, England, have proved that with certain crops, potash produces the best results in dull and wintry weather. This may explain why results have never before been obtained in such an outstanding way under average New South Wales spring conditions.

With the advent of warm December weather the yields of P 13 fell away as compared with M 22 and other plots, although the early results actually made it the heaviest yielder, and the best paying plot for the season. It is interesting to note that the nitrogen in P 11 failed to give early results, which is unusual, but produced a greater total than super-

phosphate 560 lb. per acre, which contains the same amount of phosphoric acid. The ½-ton per acre of superphosphate produced the second heaviest yield, but was not sufficient to justify the difference in cost when compared with the 5-cwt. dressing. M 22 failed to produce the same results as in previous years, owing to the cold weather preventing the early decomposition of the bonedust. The difference in yield between the three leading plots was only 36 lb. of fruit, hence there is little to choose between them, and any difference may actually be due to experimental error.

	YIELDS	of	Manurial	Trial	with	H.	Eastwood,	Tascott
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Pickings to—	phosp 560	Super- phosphate, phospha 560 lb. per acre. Super phosphate, phospha 1,120 l per acre.		nate lb.	653 lb.		P 13, 746 lb. per acre.		M 22, 560 lb. per acre.		H.A.C. Mixture. 746 lb. per acre.		No. Manure.	
30-11-29 15-12-29 30-12-29 Later	51 23	. lb. 13 17 16 8	½ bus. 7 37 76 14 135	lb. 4 0 21 4	½ bus. 9 26 60 25	lb. 4 4 12 13	½ bus. 9 38 54 33	lb. 16 0 3 13	1 bus. 6 34 77 15 133	lb. 1 6 22 15	bus. 7 34 73 15 131	lb. 9 16 23 15	1 bus. 9 28 51 13	1b. 9 23 1 8

Note.—P 11 mixtures consists of 6 parts superphosphate and 1 part sulphate of ammonia; P 13 of 6 parts superphosphate, 1 part of sulphate of ammonia and 1 part of sulphate of pota-h; M 22 of equal parts of superphosphate and bonedust; and H.A.C. mixture of superphosphate 4½ parts, sulphate of ammonia 3 parts, and sulphate of potash 2½ parts.

Sorby and Kershaw, Macquarie Fields.—This trial was conducted on good medium loam in an elevated position. Half the weight of the original application of fertiliser was used as a top-dressing. The elevation of this plot prevented the crop being affected by the cold, late season as in other districts. Three plots were included, containing M 22 The first was applied at the usual rate at transplanting time, with no further applications of fertiliser; the second was as the first, only in addition was top-dressed with 2½ cwt. per acre of P 11; the third was given a dressing of M 22 at 560 lb. per acre and P 11 at 280 lb. per acre, the whole being applied just previous to transplanting time. These three plots proved of great interest, as the planning of this trial was based on previous experimental results. The plot of M 22 top-dressed with P 11 produced a yield far in excess of any other treatment. M 22 alone was slow in action and did not produce results as in previous years. When P 11 was added at transplanting time to M.22, superior results were obtained to M 22 applied alone. However, it was definitely indicated that the P 11 should be withheld until the first fruit is half formed in order to obtain the best results. Of the rest of the plots, the two complete manures P 13 and H.A.C. mixture did not compare favourably with superphosphate alone. The excessive dressing of superphosphate (10 cwt. and top-dressing) did not produce any heavier yield than the lighter dressing (5 cwt. and top-dressing). The addition of nitrogen in P 11 produced a slight increase when compared with superphosphate alone.

YEEDS of Manurial Trial with Kershaw and Sorby, Macquaric Fields,"

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Pickings <b>to</b>	Super- phosphate. 560 lb.; top- dressing, super- phosphate, 280 lb.	1,120 lb.; top- dressing, super-	dressing, P 11,	P 13, 746 lb.; top- dressing, P 13, 373 lb.	H. A.C., 716 lb.; tops dressing, H. A.C., 373 lb.	M 22, 560 H.	M 22, 560 lb;; tops dressing, P 11, 280 lb;	M 22, and P 11, 810 lb, per acre.
15-12-29 30-12-29 Later Total	04 74 1	bus. lb. 20 2 16 23 26 21 63 22	½ bus. lb. 25 12 18 3 20 12 64 3	½ bus, lb. 20 7 17 22 17 17 55 22	½ bus, lb. 20 2 18 10 20 20 59 8	½ bus, lb. 17 9 18 18 21 6	1 bus, lb, 28 10 21 8 28 10 78 4	1 bus, lb, 21 3 21 1 3 7 73 11

<sup>\*</sup> The original heavy dressing was applied just previous to transplanting on 23rd August, 1929; top-dressing was carried out, 12th November.

The dressing of M 22 followed by a top-dressing of P 11 was tried out on commercial areas this year with outstanding success. In a normal season, M 22 assures an even and lengthy supply of phosphoric acid to the plant through its maximum growing period. P 11 is applied to increase the supply of readily available phosphoric acid and nitrogen which is essential to the plant during the heavy strain of producing the fruit. It must be borne in mind, however, that the early application of nitrogen before the fruit on the bottom bunches is set, results in the dropping of flowers.

#### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

1930

Narrandera Sheep Show (J. 1). Newth) Wentworth (W. B. Crang) Cootamundra Sheep Show Young Sheep Show (T. A. Tester) Peak Hill (W. R. L. Crush) Gigandra (G. Christle). Tullamore (S. D. Cameron) Lake Cargelligo Trundlo (W. P. Forrest) Illabo Grenfell Condobolin (J. M. Cooney) Wanga (F. H. Croaker) Gunnedah Ungarie. Galston (W. J. Fagan) Junee (G. W. Scrivener) West Wyalong Murramburgh	July 15, 16 18, 23, 24, 30, 31. Aug. 5, 6 12, 13 19, 20 19, 20 26, 27, 28, 27, 28, 26, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 28, 27, 28, 28, 27, 28, 28, 27, 28, 28, 27, 28, 28, 27, 28, 28, 28, 28, 28, 28, 28, 28, 28, 28	Parkes (L. S. Seaborn) Singleton (J. T. McMahon) Boorowa Cowrs Barmedman Bogan Gate (J. a'Beckett) Denillquin (P. Fagan) Temora Canowindra Fortes (E. A. Austen) Barellan Ardlethan Ardlethan Walbundrie (H. G. Collins) Leeton (W. Rosewarn) Hay (George O. McCracken) Narrandera (J. D. Newth) Bribbaree Ariah Park	Sept. 2, 3 3, 4, 6, 4, 5 9, 10 10 10, 16, 17 16, 17 16, 17 16, 17 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 17 18, 18, 18, 18, 18, 18, 18, 18, 18, 18,
Junes (G. W. Scrivener)	Sept. 2, 3.	Bribbaree	, 8,
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... Feb. 17 to 21, 11

Newcastle (P. Legoe) ...

#### Pea-growing Trials, 1929.

#### Experiments in the Orange District.

W. D. KERLE, H.D.A., Senior Agricultural Instructor.

Trials with green peas were conducted last season on the farms of Messrs. V. Campbell and R. W. Scott, members of Pinnacle-road Branch of the Agricultural Bureau.

Mr. V. Campbell.—The trial on this farm was to determine the most economical quantity of superphosphate to apply, and amounts ranging from 1 cwt. to 8 cwt. were used in comparison with an untreated plot.

The soil, a light loam of basaltic origin, was mouldboard ploughed in September, 1928, reploughed November, and harrowed prior to sowing. Sowing was delayed owing to dry conditions and did not eventuate until 14th January, 1929. The variety used was Greenfeast, sown at the rate of  $1\frac{1}{2}$  bushels per acre; germination was very good.

Harvesting took place from 17th to 27th March, and the following yields were obtained:—

Fertiliser.								Yield.		
								bus.	lb.	
3	cwt. super	phospha	ate per s	ere		***		104	5	
5		. ,,	*,,					101	0	
2		,,	,,					99	0	
1	**	,,	,,		•••	•••		97	25	
4		,,	,,					96	25	
8	,,	,,	,,		•••		•••	83	10	
1	To manure	***	•••		***	•••	***	74	20	

These results indicate that 3 cwt. superphosphate is ample to apply on soils in this district similar to that on which the trial was carried out, and that heavier applications are not economical.

Mr. R. W. Scott.—Two experiments were conducted on Mr. Scott's property, viz. (1) local versus imported (New Zealand) seed; (2) fertiliser mixtures in comparison with superphosphate.

The soil is a red, basaltic loam, and was mouldboard ploughed June, 1928, springtoothed September, and reploughed in early November. The variety used in each trial was Greenfeast.

The seed trial was sown on 18th January, 1929, at the rate of 1½ bushels per acre, with 150 lb. superphosphate per acre. Four pickings were made and the yields were:—

			bus.	ıb.	
Locally-grown seed		 	118	20	
Locally-grown seed Imported (New Zealand) seed	***	 	107	25	

The arresults indicate the value of local seed, and emphasise the soundness advice frequently given by the Department to per growers, to

save at least their own seed requirements. Apart from its higher production, local seed is more economical than purchased imported seed, and its use eliminates the danger of introducing serious fungous diseases and pests from other countries.

There is nearly always some period during the season when the market is glutted, and at this time it would be advisable to allow at least sufficient seed for individual requirements to mature. It takes approximately 8 bushels of green peas to make 1 bushel of seed.

The result of the manurial trial favoured a mixture of superphosphate (10 parts) and sulphate of potash (1½ parts), but all the yields were low, partly due to frost damage.

#### Manurial Trial on the Far North Coast.

M. J. E. SQUIRE, H.D.A., Agricultural Instructor.

A manurial trial with peas was conducted on Messrs. N. Joubert and Sons' farm at Terranora, Tweed River, during the past season.

The soil is a red volcanic loam and was previously cropped with sugarcane. It was ploughed and worked down just prior to planting, which was carried out on 3rd July, 1929. Greenfeast was the variety used. Germination was very poor. During the early stages of growth the manured plots were outstanding compared with the unmanured plot.

The rainfall during the growing period was follows:—July, 78 points: August, 113; September, 64; October, 363; total, 618 points. The weather conditions were fairly dry, and together with the poor germination, resulted in light yields being obtained. Harvesting commenced 1st October, and each subsequent picking was a week later than the previous one.

The results were as follows:-

YIELDS of Fertiliser Trial with Peas.

Fertiliser per acre.	ist Pickin	g. 2nd Picking.	3rd Picking.	Total.
Basic superphosphate, 7½ cwt	24 8	20 20 5 18 8 5 23 4	35 4 30 19 18 8 15 1	bus. lb. 78 13 73 10 72 17 64 8
No manure	. 14	7 10 14	18 15	43 14

Note.—M22 fertiliser mixture consists of equal parts of superphosphate and bo

# 40 minutes better than

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EDWARD G. THEODORE,

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COMMONWEALTH TREASURY.

#### Watermelons.

#### A PRELIMINARY STUDY OF VARIETIES.

N. S. SHIRLOW, B.Sc.Agr., Assistant Plant Breeder, Hawkesbury Agricultural College.

Watermelons are largely grown for market on the Hunter and Hawkesbury rivers, and some work has been undertaken at Hawkesbury Agricultural College with a view to improving the existing varieties by breeding and selection. A preliminary study is therefore being made of the varieties listed by local seedsmen together with some introduced varieties, which are being observed for characters which might be of value in cross-breeding.

In this detailed study it has been found possible to classify the varieties simply according to colour and form as a guide to seedsmen and growers.

#### Melons with Dark-green Skins generally Faintly Marked into a Netted or Mottled Appearance.

These may be divided into three classes, as follows:—

- (a) Long cylindrical shape.—Market Wonder, Kleckley Sweet, Halbert Honey, Tom Watson.
- (b) Oval shape.—The Boss, Angelino, Klondyke.
- (c) Blunt oval to round shape.—Black Spanish, Mountain Sweet, Delight, Hungarian Honey.

Market Wonder and Tom Watson appear to be the best market varieties in this group.

Market Wonder is a long, very dark-green melon, similar to Kleckley Sweet, but is larger and more productive. It is of excellent quality and the rind, although not particularly tough for transport, is superior to Kleckley Sweet in this respect.

Halbert Honey is long and rather narrow, the skin showing a faintly netted appearance. It is of excellent quality, but has a fairly thin and brittle rind.

Tom Watson has a mottled and netted skin giving it a generally lighter appearance. It is large, productive and has a good rind, indicating good carrying capacity, but the quality seems open to improvement.

The Boss, Angelino and Klondyke are of a similar type. Angelino (a new variety from America) is the best. It has a very thin rind which is against it as a carrier, but good quality and flavour recommend it for home or farm use. This variety is of further interest on account of the presence of perfect flowers.

Black Spanish and Mountain Sweet have thin rinds not suitable for transport, are rather light croppers, and are of medium quality and flavour.

Delight is a small, round melon with the skin marked into a netted appearance. It is very prolific, and has a very thin rind which is inclined to split. The quality is medium, and the melon is rather small for market.

Hungarian Honey has similar markings to Delight, but is of a larger size. It has a thin rind, not suitable for transport, and is not of very good quality.

#### Melons with Plainly Striped Skins.

These are of two kinds, as follows:--

- (a) Long cylindrical shape.—Florida Favourite, Rattlesnake, Melvo<sup>r</sup> Sugar.
- (b) Oval shape.—Cole's Early, Kolb's Gem, Guban Queen, The Dixie, Blue Gem, Ironclad, Golden Honey, Phinney's Early, Chilian Black Seeded.



Florida Favourite.

Florida Favourite is the best of the long melons in this group. The skin is marked with very dark and medium green stripes. It is of good quality and cropping capacity, and is well suited for transport on account of a thick rind.

Rattlesnake is marked with dark-green and very light-green stripes, giving it a generally lighter appearance than Florida Favourite. The melons are large, of fair quality, with a fairly tough rind, but this variety is not a very heavy cropper.

McIvor Sugar has similar markings to Rattlesnake, but is smaller in size; an excellent cropper of very good quality with a rather thin and brittle rind.

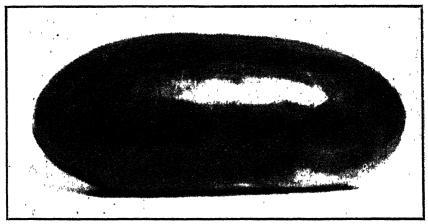
Cuban Queen is the best of the oval melons in this group for transport, as it has a tough rind. It is large, marked with broad, dark-green and very light-green stripes; a good cropper, but open to improvement in quality.

Cole's Early is marked with narrower dark- and light-green stripes, is prolific and of good quality, with a thin and rather brittle rind, unsuitable for transport.

Ironclad is of a similar outward appearance to Cole's Early with lighter coloured seeds. It has a rind of medium thickness and a fairly tough skin, and is of good quality with crisp and rather granular flesh.

Kolb's Gem and The Dixie are of a similar appearance, and medium quality and carrying capacity.

Blue Gem has the same markings but is of a bluish appearance.



Tom Watson.

Phinney's Early is marked with broken stripes, produces an even crop, and is useful on account of earliness, but is rather small in size.

Golden Honey is distinct from the other varieties as the flesh is a bright golden colour.

Chilian Black Seeded is striped with green and very dark-green stripes. The dark-green stripes are broad and give it a generally dark appearance. It is of medium size and prolific, and has a very thin rind. The flesh is of good eating quality and dark red.

#### Melons with Light Greenish to Cream-coloured Skins.

Varieties of three types come within this group, as follows:-

- (a) Long shaped.—Sugar Stick, Irish Grey.
- (b) Oval shaped.—Early Fordhook, Ice Cream, Sweetheart.
- (c) Round shape.—Cannon Ball.

Melons of this type appear to be gaining favour on the market. Sugar Stick and Irish Grey are among the best varieties of this class so far observed.

Sugar Stick is light green in colour, large, a good cropper, of good quality and suitable for transport.

Irish Grey has a creamy-coloured skin, is of medium size and a good cropper. The quality and colour of the flesh are good and although the rind is fairly thin, the skin is hard and suitable for transport.

Cannon Ball is of a creamy colour, and round in shape, crops well and is of excellent quality, but is more suited for home growing than for market on account of a very thin and rather brittle rind. This variety has perfect flowers similar to Angelino, and its high quality makes it a desirable parent for crossing, particularly with varieties such as Florida Favourite, Tom Watson and Cuban Queen, which are of good carrying capacity, but could be improved in eating quality.

Early Fordhook and Ice Cream are of a similar appearance with bright, light-green, netted skins, of very good eating quality (especially lee ('ream). but not suited for transport.

### Useful Varieties.

Of the varieties tried, those most suitable for transport are---

Dark-green.-Market Wonder, Tom Watson.

Striped.—Florida Favourite, Cuban Queen.

Light-green to cream-coloured .- Sugar Stick, Irish Grey.

For home growing and local use :-

Dark-green.—Angelino.

Striped .- McIvor Sugar, Cole's Early, Chilian Black Seeded.

Light-green to cream-coloured.—Cannon Ball, Ice Cream.

THE Annual State Conference of the Agricultural Bureau is to be held at Hawkesbury Agricultural College from 22nd to 25th of this month.

### THE WOUND INFECTIONS OF SHEEP.

Tetanus, caseous lymphadenitis (gland disease), and malignant ordema, cause very heavy economic loss, although only tetanus and malignant oedema cause heavy mortality. These three diseases are all contracted in the same way, that is, through wounds, and consequently the times when sheep are likely to become infected are at shearing and lamb-marking. Cleanliness of yards, sheds, and instruments will go far to stop these losses.

The germs which cause these diseases are found in sheep dung, dead wool, and contaminated dust. See that sheep are cut as little as possible when shearing, shear in clean sheds with clean instruments, and count-out in clean pens. Damp down the yards to prevent dust, and get the sheep on to grass as soon as possible.

If you desire further advice, consult your Inspector of Stock, who has the whole veterinary service behind him.-Max Henry, Chief Veterinary

### Farm Forestry.

# V. THE NATIVE AND INTRODUCED TREES OF NEW SOUTH WALES.

[Continued from page 443.]

R. H. ANDERSON, B.Sc. Agr., Assistant Botanist, Botanic Gardens, Sydney, and Lecturer in Forestry, University of Sydney.

#### THE COASTAL DIVISION—continued.

#### Native Trees of the Coastal Division—continued.

THE present article deals with the various native tree species of the Division other than Eucalypts and Acacias, the species being arranged in botanical order.

Brown Pine or Plum Pine (Podocarpus elata).

A medium- to large-sized straight-growing tree with a brown bark; found on good soil in brush areas from the Illawarra district northwards.

"Leaves oblong linear, 2 to 6 inches, the midvein alone prominent. Male catkins clustered. Fruit a drupe borne on an oblong, fleshy receptacle, purplish when ripe."

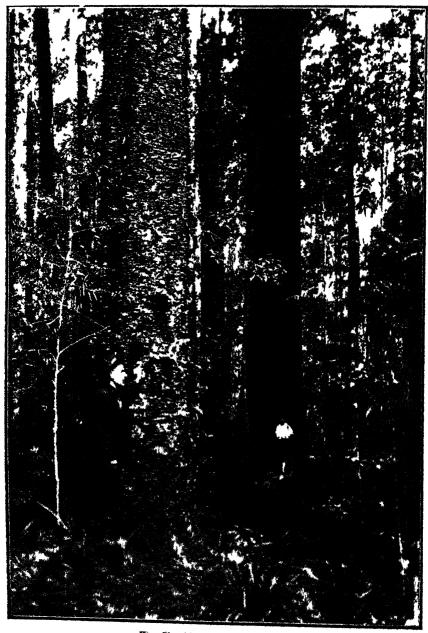
Uses.—The timber is a valuable softwood for general indoor purposes, but is seldom used owing to its scarcity. It is said to resist both white ants and the marine borer, and makes durable piles in salt water. The fleshy purplish receptacle of the fruit can be eaten, but is rather insipid. The tree is slow-growing, but makes an excellent ornamental and shelter tree.

#### HOOP PINE (Araucaria Cunninghamii).

A tall symmetrical tree with a dark-brown bark, marked or wrinkled horizontally. It is found on a wide range of soils (including rather poor sandy types—provided the rainfall is good), but does best on fairly rich loamy soils in typical brush country and on the coastal ranges. It occurs northwards from the Hastings River, and is also known as Colonial Pine, Richmond River Pine and Moreton Bay Pine.

"Leaves prickly, ½ to ½ inch long, crowded. Male catkins sessile, 2 to 3 inches. Cones 3 to 4 inches long, somewhat egg-shaped, composed of numerous crowded and flattened scales about 1 inch long."

Uses.—The timber is a valuable one, being the principal native softwood. It is suitable for general indoor work, butter boxes, plywood and matchmaking. Selected pieces have a fairly attractive figure and are used for cheaper lines of furniture and for carving. The tree is symmetrical and attractive in appearance and has a medium rate of growth. It is fairly easily grown from the large seeds, which, however, soon lose their germinating powers, and young plants are not very hardy. In plantations it should be grown with an espacement of 8 feet x 8 feet, or possibly 10 feet x 10 feet,



Hoop Pine (Arawaria Ounninghamil)

artificial pruning being often necessary owing to the long retention of the lower branches. Shade bearing, broad-leaved species, such as Teak or Beech, are sometimes recommended to be grown with it in mixture in order to protect the soil.

### Cypress Pines (Callitris spp.).

Several cypress pines are found in the Coastal Division.

Callitris columellaris is fairly common in sandy soil close to the sea, northwards from the Clarence River, and sometimes forms a very characteristic part of the vegetation, as, for example, at Brunswick Heads. It is a small to medium-sized tree, occasionally reaching 80 feet in height, and is moderately fast growing when the rainfall is good. The pale chocolate-coloured timber is very aromatic, easily worked and often highly figured, selected pieces being useful for cabinet work. It is durable and resistant to white ants.

The Stringybark Pine or Port Macquarie Pine (Callitris Macleayana) is a small to medium-sized tree, the stringy character of the bark distinguishing it from all other species of Callitris. It occurs in a few scattered localities from Coolongolook, north of Newcastle, to Queensland, both in level brush country and the steep sides of ridges. The pale-coloured fissile timber appears to be of fairly good quality, and the tree is somewhat ornamental.

The Port Jackson Pine (Callitris cupressiformis) is found in a number of localities along the coast, but mainly in the vicinity of Sydney in fairly rocky situations on sandstone soil. Well-grown trees are graceful and ornamental, contrasting quite sharply in form and colouring with the surrounding Eucalypts. The timber does not appear to be used.

Mueller's Cypress Pine (Callitris Muelleri) is also found in the Coastal Division. (See Agricultural Gazette, 1929, page 888, for full description.)

### SHE-OAKS (Casuarina spp).

The several species of Casuarina form a fairly important part of the Coastal flora.

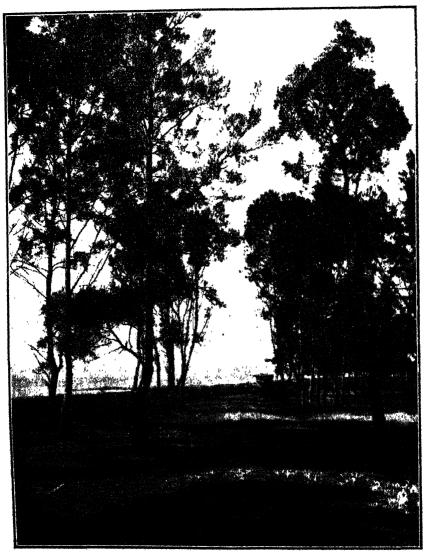
The River Oak (Casuarina Cunninghamiana) is common along many of the fresh water rivers. (See Agricultural Gazette, 1928, page 921.)

The Forest Oak (Casuarina torulosa) occurs throughout the Division, being characteristically associated with Eucalypts in the better class soils. (See Agricultural Gazette, 1929, page 887.)

The Black She-oak (Casuarina suberosa) is also common in the Division, being mainly a tree of the poorer sandy soils. (See Agricultural Gazette, 1929, page 887.)

The Drooping She-oak (Casuarina stricta) is found in the Southern and Central Subdivisions, avoiding the poor soils such as those from the Hawkesbury sandstone, and grows mainly in open situations. (See Agricultural Gazette, 1928, page 922.)

The Swamp Oak (Casuarina glauca) occurs throughout the Division, being characteristically found in swampy ground along tidal rivers and lagoons, or on brackish soil some distance from the coast. Occasionally,



Swamp Oak (Casuarina glauca).

however, it grows on drier, better-drained sites. It is an erect tree, up to 60 feet in height, rather sparse in habit, with a cracked flaky bark.

"Branchlets ascending, robust, teeth 9 to 16 in the whorl. Comes about to 2 inch diameter, flat topped."

The brownish-coloured timber has an oak figure often beautifully marked, but it is rather difficult to season and dress. It is hard, strong and heavy, and is used for fencing rails (not posts), bullock yokes, shingles, fuel and small piles in salt water.

Other She-oaks include *Casuarina equisetifolia* var. incana, a small tree with very pendulous branches found in one or two places near the ocean in the Northern Subdivision, and *Casuarina rigida*, which occurs as a shrub, mainly on poor sandstone soils.

NATIVE ELM OR ROUGH-LEAVED HICKORY (Aphananthe philippinensis).

A tree up to 80 feet in height with a scaly, brownish-grey bark; found fairly commonly in brushes of the Northern Subdivision as far south as the Manning River. It is occasionally known locally as Asbestos Tree, the ash when mixed with water and worked into balls being said to answer the purpose of asbestos.

"Leaves rough, of sandpapery texture, prominently veined, toothed. Flowers small, unisexual, the fruit or drupe with a two-branched persistent style."

Uses.—The wood is white, close grained, very tough, strong, and moderately light. It is used for axe handles, being well suited for this and similar purposes. It makes a fairly good shade and ornan ental tree, but is probably rather slow growing.

### NEGRO-HEAD BEECH (Nothofugus Moorei).

A medium- to large-sized tree found in the coastal ranges mainly on the headwaters of the northern rivers, such as the Bellinger, Macleay and Manning. It is common in the Dorrigo, particularly on clayey ground where there is plenty of moisture. The bark is brown and scaly and the general growth habit is irregular, the tree being often several stemmed. The very dark green foliage is an outstanding characteristic.

"Leaves toothed, prominently veined. Male and female flowers in separate heads, surrounded by an involucre of more or less prickly scales. Fruit opening in four valves."

Uses.—The reddish-coloured timber is hard, fairly heavy, and said to be durable, but as the species is usually in rather inaccessible places and comparatively rare, it is not exploited to any extent.

### Figs (Ficus spp.).

Some twelve species of figs are recorded in the Coastal Division. They are mainly found as large trees in brush country on fairly rich, moist soil, and are most common in the northern half of the Division. Many begin life from a seed lodged in the moist bark of another tree. Aerial roots are developed which gradually reach to the ground, enmeshing the host tree, which finally is smothered out of existence and is replaced by the fig. Consequently, the figs of the brushes may often be regarded as weed species which displace trees which are more useful from the timber point of view.

The main value of the figs is for shade, shelter and ornamental purposes. They provide excellent shade and will grow well on most classes of soils, including the poorer ones. They are moderately hardy and will stand heavy cutting or lopping. Some of them make good growth in the drier parts of the State if a little assistance is given by artificial watering. Some care is necessary in the choice of a site for planting, as the roots travel far affeld in search of food and moisture, and are therefore harmful to gardens, fruit trees and crops in the immediate neighbourhood. Cattle quite readily cat the figs and leaves of several of the species, including the Moreton Bay Fig and the Rusty Fig. The timber is generally regarded as useless for any purpose, although occasionally suggested as possibly suitable for packing cases. It is, however, as shelter and ornamental trees that the figs are valued. Propagation can usually be secured from seed, but cuttings and layers are the most general methods adopted.

The Moreton Bay Fig (Ficus macrophylla) is found in brush land from the Shoalhaven River northwards. It is a large tree with large leaves and purple figs dotted with white, and is commonly grown for ornamental and shade purposes, being adapted for a wide range of soils, including the poorer types.

The Rusty Fig or Port Jackson Fig (Ficus rubiginosa) is found from Bateman's Bay to the northern rivers and is a handsome species, distinguished by the underside of the leaves being usually rusty hairy.

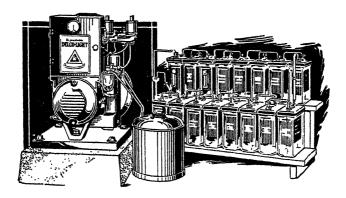
The Small-leaved Fig (*Ficus engenioides*) occurs from the Illawarra district northwards, and is recognised by the small fruits and leaves, the former being  $\frac{1}{4}$  to  $\frac{1}{8}$  inch in diameter and yellow with a few dark spots.

The White Fig (Ficus infectoria) forms a large fine tree with partly deciduous leaves which are borne on fairly long stalks. It is found in the brushes from Macleay River northwards and has a small whitish fruit dotted with red. It is commonly listed in Australia works as Ficus Cunninghamii.

The Deciduous Fig (Ficus Henneana) is a fine ornamental tree which drops its leaves but remains bare for a very short period only. It has a reddish or purple fruit spotted with white, and is found in the Port Hacking district of the Central Subdivision. It is closely allied to, and perhaps inseparable from, Ficus Muelleri, a species which is found fairly commonly in the Illawarra district and northwards. This species is also deciduous or partly so, and is sometimes known as Cedar Fig.

Two Sandpaper Figs are found in the Division, viz., Ficus stephanocarpa and Ficus stenocarpa. These are distinguished by the harsh, rough feel of the leaves. The former occurs as a small bushy tree or medium-sized tree from Twofold Bay northwards and is found mainly along the banks of creeks or streams, being sometimes known as Creek Fig. Ficus stenocarpa has the same characteristic rough leaves, but differs from Ficus stephanocarpa by having smooth, hairless fruits. It is found from the Hunter River to Queensland.

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Ficus Watkinsiana (syn. F. Bellingeri) occurs as a large tree northwards from the Bellinger River. It has large leaves, somewhat like the Moreton Bay Fig, but is readily recognised by the figs having a distinct nipple at their apex.

Ficus platypoda is also recorded from a number of localities in the northern part of the Division. It has several well-marked varieties.



Moreton Bay Fig (Ficus macrophylla).

QUEENSLAND OR BUSH NUT (Macadamia ternifolia).

A small to medium-sized tree with a roughish brown bark, occasionally reaching 60 feet in height; found in brush forests in the Northern Subdivision, being especially common in the Tweed and Richmond River districts, but extending as far south as Camden Haven.

"Leaves arranged mainly in whorls of three. Flowers in long narrow drooping racemes up to 10 inches long. Fruit 1 inch or more in diameter, the outer part splitting open on one side exposing the nut."

Uses.—The nut is edible and of excellent flavour, comparing very favourably with other nuts. It commands a good market in Sydney, and there are distinct possibilities for a small export trade. The shell of the nut is usually very hard and difficult to crack, but there is a thin shelled form which is best suited for commercial purposes. It takes approximately seven years from the time of planting the seed until the plants bear nuts. Young trees stand transplanting from the bush provided the operation is carefully carried out during the winter months. Apart from its edible nut, this tree is useful for shelter and ornamental purposes. It makes an excellent small break and specimen trees are very attractive in the garden. The timber is reddish and ornamental, but the tree is too valuable to be exploited for such purpose.

A closely allied species, Macadamia prealta, is found in brush land from the Clarence River northwards. It differs from the Queensland Nut in having alternate leaves and shorter racemes of flowers, apart from other points, and the nut is apparently regarded as of little importance. The species is variously known as Ball Nut, Opossum Nut or Beefwood, and has a fairly durable timber of the Silky Oak type which can be used for indoor fittings and cabinet work.

### Monkey Nut (Hicksbeachia pinnatifolia).

A small tree with large, deeply-lobed leaves; found from the Bellinger River northwards, mainly on alluvial flats or on good soil at higher levels, although occasionally extending to the poorer soils.

"Leaves pale yellowish-green, up to 2 feet in length, deeply divided, rigid, toothed, venation prominent. Flowers in long racemes. Fruit red, oval, hard, about 1½ inches long."

Uses.—The nut is edible, but the flavour is not so good as that of the Bush Nut. The large uncommon looking leaves give the plant an unusual appearance in the garden and the fruits are ornamental. The tree is generally too small for timber purposes.

### Silky Oak (Grevillea robusta).

A medium- to large-sized tree with dark-coloured, somewhat furrowed bark; found in brush country in the Northern Subdivision from the Clarence River to Queensland, usually not very far from the coast. Its natural occurrence is limited, but it is a well-known tree in this State owing to its general popularity for planting purposes.

"Leaves pinnate, much divided. Flowers orange-yellow, in long branched inflorescences. Fruit a boat-shaped follicle about 4 inch long, containing winged seeds."

Uses.—This is a most useful species. The timber resembles English Oak in colour and figure, although it is not so hard. It is used freely for cabinet work, indoor fittings and coach building, and has a great capacity for holding nails. It is not regarded as durable in the ground. The tree is a rapid

grower and is useful for shade, shelter and ornamental purposes, making good growth under a wide range of conditions. (See Agricultural Gazette. 1928, page 771.) The graceful, fern-like foliage is particularly attractive. It has proved a popular introduction to other countries, notably Ceylon. It is readily propagated from seed and under very favourable conditions can be established from in situ sowings.

### PRICKLY ASH OR SILKY OAK (Orites excelsa).

A medium- to large-sized tree with a grey or brown, fairly smooth bark; found in the Northern Subdivision from the Hunter River to Queensland at altitudes rarely falling below 2,000 feet. It was once very common on the Dorrigo.

"Leaves alternate, paler underneath, the margins toothed. Flowers on slender spikes. Fruit a woody follicle about 1 inch long containing one or two winged seeds."

Uses.—The timber can hardly be separated from that of the other Silky Oak (Grevillea robusta), and has similar uses. The species occurs more commonly in a natural condition than Grevillea robusta and the timber is more generally placed upon the market, being very useful for cabinet work and indoor fittings. Deposits of a whitish substance are sometimes found in logs, which dull the saws.

### A RED SILKY OAK (Embothrium Wickhami).

A tall tree, sometimes becoming shrubby, with a brownish, somewhat rough bark; found in a few localities in brush land from the Dorrigo northwards. It is also known as "Tree Waratah" owing to the resemblance of the flowers to those of the ordinary Waratah.

"Leaves usually pinnate. Flowers large, orange-red, crowded at the ends of branches. Fruit cylindrical, 3 to 4 inches long, opening on side. Seeds winged."

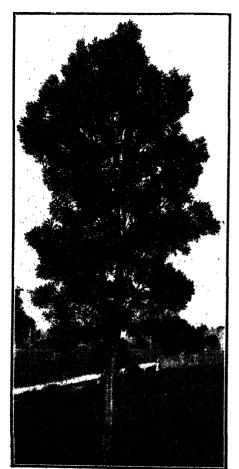
Uses.—The ornamental timber is reddish when cut, but drys much paler, being only slightly deeper in tint than that of the ordinary Silky Oak, which it resembles in general appearance. It is, however, lighter and more easily worked. The tree is an ornamental one and the shrubby forms present a very attractive appearance.

THE WHEEL TREE OR FIRE TREE (Stenocarpus sinuatus).

A medium-sized tree sometimes reaching 100 feet in height with a dark grey or brown wrinkled bark; found in brush country in the Northern Subdivision from the Bellinger River to Queensland. It is sometimes known as White Silky Oak.

"Leaves large, most variable in shape, entire or deeply lobed, up to 12 inches long and paler underneath. Flowers large, bright red or orange, arranged in whorl-like clusters at the ends of branchlets. Fruit a folliele somewhat boat shaped, 2 to 4 inches long, containing numerous thin flattened seeds."

Uses.—This species is most ornamental and under cultivation can be kept small enough for the average garden. It is a useful shade and shelter tree, but is rather slow growing for these purposes. It makes its best develop-



Wheel Tree or Fire Tree (Stenocarpus sinuatus.)

ment on well-drained deep soil in fairly sheltered situations. The timber is pale-coloured, moderately hard and attractively figured somewhat in the manner of Silky Oak.

Scrub Beefwood (Stenocarpus salignus).

A medium-sized tree with a brownish, finely wrinkled bark: found in rain forests from Milton in the Southern Division to Queensland. It is often referred to as Silky Oak.

"Leaves elliptical, narrowed at each end, 3 to 5 inches long. Flowers white or greenish white. in small dense umbels at the end of a slender stalk. Fruit a follicle 2 to 4 inches long."

Uses. - The red fissile timber is fairly hard and heavy, and is very handsomely marked. It is a good substitute for ordinary Silky Oak for cabinet work and indoor purposes generally. The tree is fairly ornamental, but the flowers are quite inconspicuous compared with those of the Wheel Tree.

Socker Wood (Daphnandra micrantha).

A medium- to large-sized tree with a greyish bark, often rough with small excrescences; found in rain forests from the Hunter River northwards. It is also known as Light Yellow Wood, Satin Wood, and occasionally as Sassafras. It is characterised by swellings at the base of the branches where they join the stem, forming a socket-like joint, thus giving rise to the vernacular name of this species.

"Leaves opposite, coarsely toothed. Flowers inconspicuous, in small axillary panicles. Fruit almost cylindrical, i inch to 1 inch long, containing several slender carpels covered with fine brown hairs."

Uses.—The yellowish timber is not durable, but is occasionally employed for indoor work, being fairly light and easily worked. The bark is bitter and has some medicinal properties. The species is moderately ornamental.

### NEW SOUTH WALES SASSAFRAS (Doryphora sassafras).

A medium- to large-sized tree with grey bark; found in all subdivisions in brush country, both on the better class and rather poorer soils and ascending to the Tableland Division in parts, going as far west as Jenolan Caves. Both bark and leaves are fragrant.

"Leaves opposite, coarsely serrate. Flowers white, about 1 inch diameter with six segments. Fruits narrowly egg-shaped, ½ to ¾ inch long, splitting on one side exposing the carpels, which are covered with brown hairs."

Uses.—The pale yellowish timber is fairly soft and light and is not durable outdoors, but is suitable for indoor work such as lining and flooring. It is used fairly extensively for such purposes in some districts, being occasionally known as Golden Deal, and is said to be very resistant to white ants and borers. It takes, however, a long time to season properly, being difficult to dry. It is an ornamental species, the white star-like flowers contrasting attractively with the bright glossy foliage. An infusion is made by bushmen from the bark, and is said to have tonic properties.

### OLIVER'S SASSAFRAS (Cinnamomum Oliveri).

A large tree with a brownish fragrant bark, more or less rough with excrescences; found in rain forests in the Northern Subdivision.

"Leaves opposite, lanceolate, paler underneath, 3 to 7 inches long. Flowers small, in panieles. Fruit an oval single-seeded berry about ½ inch long, seated in the enlarged cup-like portion of the perianth."

Uses.—The close-grained greyish or light-brown timber is easy to work and useful for many indoor softwood purposes. It retains its fragrance more or less indefinitely, but is said to be very susceptible to attack by borers. The strongly aromatic bark is sometimes used for flavouring purposes. A useful ornamental and shade tree.

A closely allied species, Cinnamonum vircus, is sometimes known as the Native Camphor Laurel, and has much the same general features as the above. It differs botanically in having both sides of the leaves of a more or less uniform colour, and in the bark being non-aromatic. It is found in scattered localities in rain forests in the Northern Subdivision.

### SHE BEECH OR BOLLY GUM (Litzea reticulata).

A large tree with a brownish, somewhat scaly, bark; found fairly commonly in brush lands from the Hawkesbury River in the Central Subdivision northwards to Queensland. It is also known locally as Brown Beech or Bolly Beech.

"Leaves alternate, oval, 2 to 4 inches long, somewhat leathery. Male and female flowers on separate trees, in short axillary racemes. Fruit single-seeded, black when ripe, seated in a large cup-shaped receptacle."

Uses.—The timber is a very useful softwood for indoor joinery and cabinet work. It is pale brown, light in weight, often attractively figured, and easy to work. The tree is suitable for ornamental and shade purposes in warm moist localities.

In addition to the above, there are three other species of Litzen found in the Coastal Division.

Litzea hexanthus (syn. Litzea ferruginea) is found fairly commonly in the Northern Subdivision, being known as Brown Bolly Gum or White Sassafras. Its timber is similar to that of the Bolly Gum.

Litzea dealbata occurs as a small, or occasionally medium-sized, tree in the Illawarra district and northwards to Queensland. It has reddish-purple aromatic fruits, handsome leaves with a paler undersurface, prominent venation, and timber of the Bolly Gum class.

Litzea zeylanica is found in a few localities north of Gloucester.

### NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.

THE Co-operative Bud Selection Society, Ltd., supplied the following selected Valencia Late orange buds to nurserymen during the 1929 budding season, trees from which should be available for planting during this present year :--Toward.

	.buas.
T. Adamson, Ermington	3,100
T. Eyles, Rydalmere	3,500
F. Ferguson and Son, Hurstville	1,500
R. Hughes, Ermington	1,000
G. McKee, Ermington	
L. P. Rosen and Son, Carlingford (late of Epp	ing) 11,400
Swane Bros., Ermington	500

-C. G. SAVAGE, Director of Fruit Culture.

### THE NEW SOUTH WALES WHEAT HARVEST, 1929 30.

FULL details of the 1929-30 wheat harvest are now to hand from the Government Statistician.

The total area sown with wheat was 4,335,000 acres.

The area sown for grain was 3,902,200 acres, including 163,000 acres which failed entirely, and the grain harvested amounted to 11,316,000 bags, equivalent to 33,948,000 bushels, or an average of 8.7 bushels per

The area sown for hay was 375,100 acres, including 25,200 neros which failed, and the production of hay was 305,710 tons, or an average of 0.81 tons per acre.

The area fed-off profitably was 57,700 acres.

The yield of grain was 30 per cent, below the average of the preceding ten years. The Northern Tableland division yielded highest with an average of 20 bushels per acre, then coming the Southern Tableland with 17.3 bushels, North-western Slopes 15.5 bushels, North-central Plain 13.1 bushels. Central Tableland and South-western Slope each with 9.6 bushels. the Riverina 9 bushels, the Central Plain 5.5 bushels, and the Contralwestern Slope 4.8 bushels.

# Bacterial Blight of Beans.

C. J. MAGEE, M.Sc., B.Sc.Agr., Assistant Biologist.

This disease is caused by the bacterial parasite, *Bacterium phaseoli*. Losses from the disease result from defoliation of the plants, spotting and rotting of the pods, and girdling and death of the stems. All varieties of common beans are susceptible. Moist, warm conditions favour its development.

The symptoms of bacterial blight on bean foliage are much more conspicuous than are those of anthracnose (see departmental pamphlet dealing with this disease). Small water-soaked areas appear on the leaflets, and these later give rise to large irregular brown spots with yellow margins

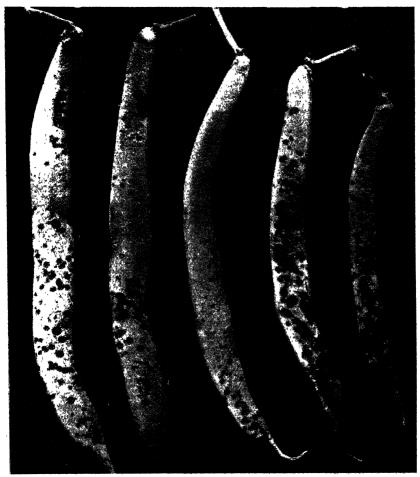


Fig. 1.-Bean Pods Affected with Bacterial Blight.

(Fig. 2). The spots become dry and papery at their centres, and frequently have a glistening encrustation on their surfaces. A few spots on one leaflet are sufficient to cause its death. Frequently total defoliation of plants will take place.

The spots on the pods (Fig. 1) first take the form of minute dark-green dots. These increase in size to form large water-soaked blotches. Under moist conditions a yellowish ooze may form on their surfaces. This ooze gradually darkens and dries to form a yellow encrustation. The affected tissue does not dry and shrivel as it does in the leaf, and is never black as in the case of authracuse.



Fig. 2.—Bacterial Blight on Bean Leaf.
[After Chupp.

The disease may penetrate the pod and attack the seed within. In the case of severe attack the seed may be more or less shrivelled, but when infection is slight the seed may show no apparent injury, or only a yellowish discolouration at its point of attachment to the pod. It is usually difficult to recognise diseased beans after they have been removed from the pods unless shrivelling has taken place.

The disease is carried over from season to season by the planting of infected seed, but it is also known that the germs of the disease may live over for long periods on boan refuse in the soil. When diseased seed is planted the seedling may not come above ground,

or if it does, it is deformed and dwarfed, and bears blighted spots on the seed, leaves and stems. Under weather conditions favourable to the disease, a few plants of this type will serve as centres of infection for an epidemic.

The germs of the disease are spread by insects, pickers, the spattering of rain, &c. The yellowish coze which forms on the surface of the spots on the foliage and pods consists of myriads of bacteria, which under the action of wind-driven rain may be spread over wide areas.

### Control Measures.

The following measures are recommended for minimising losses from this disease:—

1. Select seed from only clean crops. The crop should be kept under close observation while growing, and if blight be present should not be

saved for seed. Treatment of seed from an infected crop with fungicides is of no value since the germs of the disease may be internal to the seed-coat as well as on its surface.

- 2. As far as practicable, burn all diseased material.
- 3. Practise a rotation of crops.
- 4. Do not cultivate or pick beans affected with blight or anthracuose during wet weather or when the plants are wet with dew.
- 5. Plant a special plot of beans each year for seed purposes only. This plot should be isolated and be carefully watched for the slightest trace of disease. Affected plants should be removed at once and burned.

### EMPIRE MARKETING BOARD PUSHES TUNG OIL PRODUCTION.

ACCORDING to London reports, the production of tung oil is to be encouraged by the Empire Marketing Board, which has approved of a grant to the Royal Botanic, Kew, England, for the distribution of tung oil seeds to various parts of the Empire.

Tung oil has many uses, being an essential constituent of high-grade varnishes. Australia imported 139,967 gallons, valued at £40,205, during 1928-29.

Until recently the world's wants were almost entirely supplied by China, but since the war, tung oil production has become a somewhat important industry in U.S.A. According to local authorities, it should be possible to grow the tung oil tree in this country.

# THE PROSPERITY OF THE DAIRY INDUSTRY LARGELY DEPENDS ON QUALITY.

MEN in the dairy business who complain about prices for dairy products should not lose sight of the fact that the consumers of the country would eat a lot more of their produce if the quality were better. They have themselves to blame when the demand is not sufficient to keep prices at a profitable

point.

High quality in food products serves to increase the number of units consumed. In this respect food products are different from most other products. When a man pays a comparatively high price for a pair of shoes, he generally wears them longer than he would wear a pair of poor shoes. The shoe manufacturer reduces the demand for shoes by making high quality shoes. Each pair of the higher-priced shoes gives the purchaser longer wear. On the other hand, the housewife who pays a comparatively high price for a pound of good butter or a pound of good cheese does not expect it to last at the family table because the quality is good.

Thousands upon thousands of farmers complain about prices for dairy products and yet they refuse to turn a hand to improve quality. Producers and manufacturers of dairy products—cheesemakers in particular at the present time—are waking up to the fact that the prosperity of the dairy industry depends upon quality as well as quantity, quality coming first.—

I. T. MACINNES, Director of Dairying.

# Lamb-raising Trials, 1929-30.

### Hawkesbury Agricultural College.

L. H. BEVERIDGE, H.D.A., and J. C. COTSELL. Sheep and Wool Instructors.\*

The object of these trials is to test the value of Border Leicester, Ronney Marsh, and Dorset Horn rams as sires of fat lambs from crossbred and comeback ewes under Hawkesbury College (Richmond) conditions.

Utilising the female breeding stock available, 156 College-bred Rouney Marsh x Comeback ewes, 4- and 6-tooth, and seventy-five aged Comeback ewes were employed, supplemented by 261 Arrawatta-bred Ronney Marsh x Merino ewes, 4-tooth. These three types were equally distributed between the three breeds of rams as under:-

	{ College ewes Arrawatta ewes Comeback ewes		52 87
Group A.—5 Dorset Horn rams	\ Arrawatta ewes	• • •	
•	(Comeback ewes	•••	25
			164
	College ewos		52
Group R -5 Border Leicester rams	Arrawatta ewes		87
Group B.—5 Border Leicester rams	Comeback ewes	•••	52 87 25
			164
	College ewes		52
Group C5 Romney Marsh rams	College ewes Arrawatta ewes Comeback ewes	***	52 87
Group C o reornitely marsh ranks	All to wood out is		
	Comenack ewes	***	25
			164

The rams (approximately 3 per cent.) were joined on 14th March, and taken out on 2nd May, a seven-week mating period.

The conditions throughout the winter were severe-heavy frosts and little rain being experienced. Nevertheless, the ewes maintained satisfactory condition until mid-July, when seventeen died from suspected forage poisoning. During the second week in August, twenty-one ewedied from preparturient apoplexy. These losses on a large scale ceased when the ewes were moved to a fodder crop of oats.

The Lambing.

Lambing commencing on 5th August and very little assistance was afforded the ewes. Owing to scarcity of paddocks all three groups were lambed together and distinguishing private marks put in the lambs' ears shortly after birth. A noticeable feature of the lambing was that of the lambs born in the first two weeks of the period, the majority were Dorset Horn crosses; of those born during the second fortnight, the majority were Border Leicester crosses, while the Romney Marsh crosses predominated

Mr. Cotsell took over the position of Instructor in Sheep and Wool from Mr. Reveridge on 28th December.—E. A. ELLHOTT, Sheep and Wool Export.

<sup>\*</sup> These trials at Hawkesbury College are showing what can be accomplished by improved feeding methods under very poor soil conditions, and are demonstrating the superiority of the Dorset Horn as a sire for fat lambs.

during the latter end of the period. This was a further instance of the capacity of the Dorset Horn ram for working at an earlier date.

Marking took place on 19th and 26th September and 4th October, the numbers being-

				Per cen	ιt.
Dorset Horn crosses		•••	123	 75	
Border Leicester crosses	•••	•••	121	 73.7	
Romney Marsh crosses	•••		120	 74	
•					
			364		

The spring conditions were the best experienced at the College for years. The ewes and lambs were grazed on 55 acres of Mulga and Algerian oats and approximately 35 acres of lucerne, and for short periods on natural pastures. The Dorset Horn crosses made the best growth throughout, followed by the Border Leicester and Romney Marsh in that order.

#### The Market Returns.

In December it was decided to market thirty-four lambs of each cross. These were sold, off their mothers, on 19th December, and realised the following prices:—

Dorset Horn crosses	•••		 10 @ 16s. 10d.
,,		•••	 24 @ 16s. 9d.
Border Leicester crosses		•••	 34 @ 14s. 10d.
Romney Marsh crosses	•••	•••	2 @ 16s. 6d.
••	•••	•••	 32 @ 12s. 4d.

The market was over-supplied, there being 56,000 yarded. The Dorset Horn lambs were of excellent quality, estimated to dress about 33 lb., and there was nothing superior to their weight penned; the Border Leicester lambs were a little lighter, but lacked the finish of the Dorset Horn; the Romney Marsh lambs were a little lighter still and also lacked finish.

It should be noted that there were far more Dorset Horn crosses ready for market (eighty could have been sent) when the lots were sold, but for the purpose of comparison even numbers of lambs of each cross were despatched.

On 5th February, 1930, a further draft of sixty lambs, off their mothers, selected on condition only, and irrespective of breed, was forwarded to Flemington. The draft was even and the lambs of good quality with the exception of four Border Leicester crosses which were not up to the standard of the remainder. The consignment comprised thirty-six Dorset Horn lambs, twenty Border Leicester lambs, and four Romney Marsh lambs. Unfortunately the market was heavily stocked, 57,000 being penned that day, and 100,000 for the week. Prices realised were:—

```
36 (Dorset Horn) @ 17s. 7d.
24 (Border Leicester and Romney Marsh) @ 16s. 10d.
```

Conditions were dry during the early part of the year. The natural pastures burned off and there was very little grazing lucerne available. On 21st February the remainder of the lambs were weaned and given whatever good pasturage was available. About the middle of April a further eighty lambs were fit for marketing, but as the remaining lambs were required for killing demonstrations, they have been retained at the College.

Three lambs of each group were selected for slaughter at Flemington and subsequent exhibition of the careases at the Royal Show in April. These were highly commended and returned the following prices: -

Dorset Horn × Romney-Merino (93 points), -99 lb. @ 7d. = 198, 3d. each. Border Leicester × Romney-Merino (92 points), -92 lb. @ 7d. - 188, 1d. each. Romney × Romney-Merino -- (78 (288 points), -94 lb. @ 7d. = 188, 3d. each.

### TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address-	Number tested.	ertifica	ie			
E. P. Perry, Nundorah, Parkville (Guernseys)				28	14 Jum	1080
J. F. Chaffey, Glen Innes (Ayrshires)		•••		56	29 ,,	1930
Sacred Heart Convent, Bowral		•••	***	11	17 July	1930
A. Shaw, Barrington (Milking Shorthorns)	•••	•••		120	Z Aug.,	1930
St. Patrick's College, Goulhurn				9	7 ,	1930
Walter Burke, Bellefaire Stud Farm, Appin (Jerse	ув)	***	•••	52	17 ,.	1930
MILLAGOR PARIN HOMES, MILLEROUX	***	***	•••	85	80	1980
H. W. Burton Bradley, Sherwood Farm, Moorland	l (Jersey	78)	***	79		1930
James McCormick, Tumut	***	•••	••	94	, 5 ,.	1930
Walaroi College, Orange	***	•••	•••	- 9	19 ,,	1930
Riverstone Meat Co., Riverstone Meat Works, Riv	erstone	***	**	115	27	1930
J. L. W. Barton, Wallerawang	•••	•••	!	18	9 Oct.,	1980
Blessed Chanel's Seminary, Mittagong	. •••	•••	•••	_5	25	1930
H. A. Corderoy, Wyuna Park, Comboyne (Gueruse	ун)	***	•••	54	1 Nov.,	1930
Glen Innes Experiment Farm (Ayrshires)	***	•••	***	62	3 ,,	1930
S. G. Winkley, Dorrigo	***	***	***	85	,8 ,,	1930
J. Davies, Puen Buen, Scone (Jerseys)		***	***	40	11 ,,	1030
Department of Education, Brush Farm, Eastwood		•••		7	22 ,,	1930
Lunacy Department, Callan Park Mental Hospital		***	**-	28		1930
Bathurst Experiment Farm (Jerseys)	***	***	***	30		1930
Lunacy Department, Morisset Mental Hospital		•••	***	21	, wageto,	1831
Parbery, C. J., Allawah, Bega Wagga Experiment Farm (Jerseys)	•••	•••	***	88 78	4.6	1931
Kinross Bros., Minnamurra, Invereil (Guernseys)	***	***	***	72	m m ''	1931
New England Girls' Grammar School, Armidale	***	***	***	19	44	1931
Lunacy Department, Parramatta Mental Hospital	***	•••	***	89	A P	1031
Miss Brennan, Arrankamp, Bowral	***	***	***	10	79 Feb.	1981
Department of Education, Yanco Agricultural Hig	h Baha.		***	88	A 4 4	1981
G. A. Parrish, Jerseyland, Berry			***	103	-	1931
Lunacy Department, Kenmore Mental Hospital	***	***		76	2541	1981
Hawkesbury Agricultural College (Jerseys)	***	***	***	160	i Mar.,	1081
St. Joseph's Girls' Orphanage, Kenmore	***	***	***	10		1931
St. Michael's Novitiate, Goulburn	***	***	***	΄Ř.,		1931
Kyong School, Moss Vale	***	***		8	4 ::	1081
St. Joseph's Convent, Reynold-street, Goulburn	***	***		4	4	1081
St. John's Boys Orphanage, Goulburn	***	***	***	7	ŝ ;;	1931
Marion Hill Convent of Mercy, Goulburn	***	***	***	10	6	1981
Cowra Experiment Farm		***		29	6 ,,	1931
Riverina Welfare Farm, Yanco Wilkins, James, Jerseyville, Muswellbrook		***		60	6 ,,	19.11
Wilkins, James, Jerseyville, Muswellbrook		***		51	12 ,,	1931
Tudor House Echool, Moss Vale		•••	***	8	21 ,	1981
H. F. White, Bald Blair, Guyra (Aberdeen Angus)		***	***	220	8 April,	1981
Grandou Experiment Karm (Avrantes)			***	180	5 ,,	1981
Department of Education, Huristone Agricultural	High 8	chool	***	4.5	10 ,,	1981
MAYUA LEG. STORE WOID. THE KINDYNORA (Township)	***	***	***	13	29 ,,	1981
Australian Missionary College, Cooranbong				45	30 ,,	1931
modulian, J. P., Bellingta Hotal Rethinors		***	***	- ñ	1 May	1931
George Rose, Avimerton		***		4	28 ,,	1941
William Thompson, Masonic School, Baulkham H.	ills	***	•••	47	28	1931
Department of Education, Gosford Farm Homes		***	***	30	3 June.	1931
F. C. Kershaw, Macquarie House, Macquarie Field P. Ubrihien, Corridgeree, Bega	ds	***		71	5 ,.	1981
r. Obrinsen, Corridgeree, Begs		***		114	6	1981

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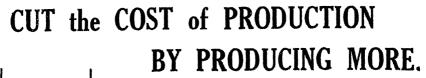
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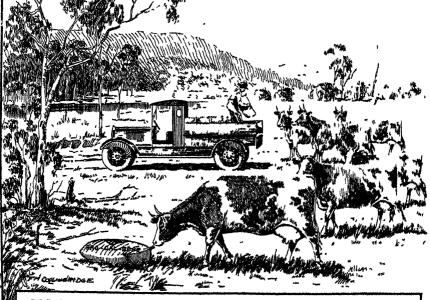
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## Feeding Pigs on Rough Rice.

AN EXPERIMENT AT HAWKESBURY AGRICULTURAL COLLEGE.

F. WHITEHOUSE, B.V.Sc., Veterinary Surgeon, Stock Branch and F. BOSTOCK, Piggery Instructor, Hawkesbury Agricultural College.\*

This year rough rice was obtainable in bulk at such a price that its use as an economical pig food was the subject of many enquiries from farmers. Since wheat is the standard grain fed to pigs in New South Wales, the question arose as to the economic and nutritional relationship between rough rice and wheat as pig feed.

To ascertain this it was decided to take stores of the Tamworth and Berkshire breeds, and to feed them to bacon weights, approximately 177 lb. live weight. Accordingly, four Tamworths and six Berkshires (ten pigs) with an average live weight of 95.7 lb. were chosen for the rice lot, and three Tamworths and six Berkshires (nine pigs), with an average live weight of 88.2 lb., for the wheat lot. The difference in the two lots of pigs appeared much less than the difference in weights would suggest.

The pigs were run in bare yards in the old piggery, in each of which an open-fronted shelter shed was provided. Unfortunately no wooden floors were in these sheds, and owing to the very heavy rains experienced during the experiment the sheds became flooded, making it necessary to move both lots to more suitable quarters, and emphasising the advisability of providing good warm shelter sheds with wooden beds or floors. The soil in both yards was sandy loam, allowing for good drainage.

### The Rations Test.

In arriving at suitable rations the percentages of digestible nutrients shown for the constituents of the ration in *Feeds and Feeding*, by Henry and Morrison, were used, together with the following chemical analysis of rough rice by the Chief Chemist of the Department:—

	Crude Protein.	Carbohydrates.	Fat.
Rough rice	 6.12	69.7	1.71

In drawing up rations the greatest difficulty was in the reduction of bulk, several apparently very suitable rations being much too bulky. Taking into consideration work done elsewhere on rice feeding, it was decided to compare rough rice and a little meat meal with wheat. The commencing rations chosen were:

	Lot	1,		1	Lot :	2.	
Rough rice (coarsely	grou	nd)	3 lb.	Wheat (coarsely	ground)		3 lb.
Meat Meal		• • •	} lb.	Separated milk	•••		7 .,
Separated milk		•••	7 lb.	Coarse Salt			l oz.
Coarse salt		•••	l oz.	Water in ration			9 lb.
Water in ration	•••		10·5 lb.	Lime-water			1 pint.
Lime-water		•••	l pint.	Green Wheat	•••		1·75 lb.
Green wheat			1.75 lb.				

<sup>\*</sup>Report of an experiment carried out at the direction of the departmental subcommittee dealing with feeding experiments—Messrs. McDonald, Henry, Southee, and Grant.

The nutritive ratios were: Lot 1, 1:4.95; Lot 2, 1:4.85. In both cales the grain was coarsely ground and boiled, and the ration was fed in two

equal feeds, at 7.30 a.m. and 4 p.m.

In the preparation of feeds it was found that the rice ration could be prepared much more rapidly than the wheat ration. In both cases if the grain be put into cold water it takes three hours before the ration is ready for service, but if the crushed rice be put into be iling water it produces a softer and more palatable feed and takes only 1 alf an hour to prepare. Owing to the fact that pigs were in bare lots, a ach pig received in the afternoons 1.75 lb. of green wheat, which, however, i can out on 14th October and was replaced with a similar amount of green luce the per day per pig. Fresh water was accessible at all times.

Proportionate increases in rations were made as deemed advisable, according to the ingestion and increases made. The following table shows these increases and the nutritive ratios of the rations:

INCREASES in Rice Ration fed to Pigs in Lot 1.

Minima control and origina spine	Rations ted as from dates indicated									
Date when rations increased.	Rice.	Separated Milk.	Meat Meal	Green feed.	Total digestible putrients.	Untilities ratio of ration				
	Ib.	16.	lb.	lb.	lb.					
14 Sept., 1929	4.0	10	0.25	1.75	1-33	1:507				
28 Sept , 1929	4.5	10	0.25	(Whest) 175 (Wheat)	1-63	1 : 5-37				
12 Oct., 1929	5-0	10	0 25	1.75	1	1:5-66				
14 Oct., 1929	5-0	10	0-25	(Wheat) 1-75	1-99	1 : 5-36				
19 Oct., 1929	5•3	10	0-25	(Lucerne) 1·75 (Lucerne)	5 36	1:584				

Increases in Wheat Ration fed to Pigs in Lot 2.

		Ration	s fed as from dates in	dicated,	
Date when rations increased.	Wheat.	Separatod Milk.	. Green feed.	Total digestible nutrients	Nutritive ratio of ration
14 Sept., 1929 28 Sept., 1929 12 Oct., 1929 14 Oct., 1929 19 Oct., 1929	1b. 4·0 4·5 5·0 5·0 5·5	1b. 10 10 10 10	1b. 1.75 (Wheat) 1.75 (Wheat) 1.75 (Wheat) 1.75 (Lucerne) 1.75 (Lucerne)	10. 1·44 4·77 5-17 5-57	1:4-89 1:4-89 1:5-01 1:4-81 1:4-95

Coal cinders were self-fed, and as early as 19th September their ingestion by Lot 2 was much greater than by Lot 1, this preference continuing throughout the test.

The following analyses (wheat and rice by Henry and Morrison, and coal ash by Jensch) seem to indicate that the presence of silica is of some moment in the metabolism of the pig. There is little doubt the pigs sought the cinders for their iron content, yet the presence of high quantities of silica in the cinders did not depreciate the value of the ration.

				_		
ANALYSES	of	Wheat,	Rice,	and	Coal	Ash.

Feeding Stuff.	Ash in 1,000 lb. of feeding stuff.	Alkalies $K_2O$ & (Na <sub>2</sub> O).	Lime (CaO).	Mag- nesia (MgO).	Iron Oxide (Fe <sub>2</sub> O <sub>3</sub> ).	Sulph- uric Acid (SO <sub>d</sub> ).	Phosphorie Acid (P <sub>2</sub> O <sub>5</sub> ).	Silica (SiO <sub>2</sub> ).	Chlorine (C1).
Wheat	10	6.9	0.6	2.2	0.23	5.4	8-6	0.4	0.82
Rice (rough)	49	3.6	0.2	1.2	0.31		4-9	41.6	0.02
*Coal Ash	1,000	21.7	60.2	24.4	156.8	128-3	12.9	394.5	

<sup>\*</sup> Coal ash also has traces of alumina, manganese, zinc, and lead.

Probably the pigs in Lot 1 received much of their iron from meat meal and Lot 2 from the cinders.

### The Progress of the Experiments.

The appearance of the pigs varied as the experiment progressed. The pigs were healthy at the commencement of the test on 21st August, 1929, and no untoward symptoms, with the exception of temporary lameness of no moment, were noted.

The fæces in both lots throughout remained soft, but those of Lot 1 soon became dark bluish-green. They were very fibrous, containing a high percentage of unbroken and obviously undigested rice husks, leading to the conclusion that little husk was being digested. According to Hughes, of California, 162 lb. of rough rice produced on milling 100 lb. of polished rice, 20 lb. of rice bran, 7 lb. of rice polish and 35 lb. of chaff or hulls. Though the fibrous content of the fæces of Lot 1 was maintained to the end of the experiment, the colour became gradually light brown.

The appearance of both lots was good until the commencement of the third week (4th September), when bad weather set in, the yards becoming flooded. On 11th September it was noted that the pigs in Lot 2 were variable, some being in excellent health and carrying much bloom, others unkempt. The pigs in Lot 1 were all showing bloom and apparently withstanding the weather conditions better than Lot 2. On 19th September the pigs in Lot 1 still had the advantage in size and bloom. However, Lot 1 did not retain the advantage, and though apparently always well filled the

pigs commenced to lose the bloom they had. From the beginning of October, though both lots made steady gains, but 1 did not regain the bloom and Lot 2 improved in bloom.

From 9th October the weather was very unsettled, with flood rains, and it was necessary to move both lots to other yards.

The rainfall throughout the experiment was as follows: - -

		Points.					Point⊲.		
1st week			•••	47	6th week		•••		41
2nd week				1	7th week		•••	•••	***
3rd week	•••	•••	•••	13	8th week			•••	539
4th week		•••	•••	237	9th week	•••	•••	•••	. 1.1
5th week	•••	•••	•••	33	d.	otal			116,11

### The Weekly Weights.

The weighing of individual pigs was carried out every seventh day on a spring balance, the pigs first being crated. The following table shows the weights recorded, the gains made by each pig and the average each week for both lots.

Four representative and comparable pigs, two (one of each breed) from each lot, were selected and killed and submitted to the curing process at the College bacon factory. The cured sides were forwarded to Messrs. Mackay and Company, and their report reads: "Berkshire barrow, rice ration, Lot 1—Conformation of side very fair, a trille narrow in middle in comparison to size, but shoulder trifle thick. The grain of meat was nice and close, and ratio of fat to lean very good. Texture very soft and pappy. Colour trifle dull. Berkshire barrow, wheat ration, Lot 2—Conformation only fair, too narrow in middle, and round chubby shoulder far too fat. Colour very dull. This side was far too fat, the ratio of fat and lean being unsatisfactory."

A report on all pigs in the experiment by Mossrs. Mackay and Co. would have been of much value. The above report on the pig fed on the wheat ration cannot be taken as typical of pigs in general fed on such a ration.

The remaining fifteen pigs were sent to Homebush Abattoir saleyards for sale as baconers, and they realised £66 17s. 6d., the rice fed pigs averaging £4 9s. 7½d. and the wheat-fed pigs £4 8s. 7½d.

The Tamworth pigs in the rice-fed lot made an average gain of 90 lb. per pig, and the Berkshires of 75 lb. per pig, whilst the account sales for pigs of these breeds in this lot averaged, respectively, £4 15s. 6d. and £4 6s. 1d.

In the case of the wheat-fed lot, the average gains were Tumworth 79 lb. and Berkhsire 92.6 lb. per pig, whilst the account sales averaged respectively £4 ls. 6d. and £4 lls. 6d. each.

While it is realised that the number of pigs involved is not sufficient from which to draw definite conclusions, these results appear to indicate that the Tamworth breed is more capable of assimilating a harder and coarser type of grain such as rice, while the Berk-hire breed can put to better use a softer, finer grain as typified in wheat. This point would form the basis of a very interesting and valuable experiment.

Losses).
ō,
Gains
and
Weights
Weekly

Total Grin.		<u> </u>
dan or Loss,	18.3 13.3 13.3 13.3 13.3 13.3 13.3 13.3	18.
Weight on 2s-10-29,	160 191 179 183 183 183 184 169 176 176 180 180 180 180 180 180 180 180 180 180	1/9.3
Gain or Loss,	€. 80 - 10 - 10 4 - 1 - 10 - 10 - 10 - 10 -	#
Weight on 16–10–25.	15.0 16.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0 17.0	8.00T
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Gain or Loss.	10. 10. 10. 10. 10. 10. 10. 10. 10. 10.	F.77
Weight on 2-10-29.	127 170 170 170 185 188 183 183 180 180	Z-6+1
Gain or Loss.	H	13.5
Weight on 25-9-29.	Pigs.  10. 11. 11. 12. 13. 13. 13. 13. 13. 13. 13. 13. 13. 13	1.751
Gain or Loss.	1 10 10	o.er
Weight on 1889.	Chico-fed   Chic	G.#21
Gain or Loss.	Lot 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1	7.0
Meight on 11—9-29.	11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11.00 11	8.017
Galn or Loss.	H	D.# #
Weight on	H. 102 H. 103 H. 104 H. 105 H.	0./07
Gain or Loss.	සැකකකහපත ක් පැක්කකතහපත සු දැකකකතපත ක් පැක්ක ක් සැකකක සු	<del>†</del>
77 elght ou 28-8-29.	H. 100.7 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100.2 100	93.0
Welght on 20-8-29.	H. 108 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	28.2
. Sex.	Bartow Sow Sow Bartow Sow Sow Sow Sow Sow Bartow Bartow Sow Cow Sow Bartow Bartow Bartow Sow Sow Sow Sow Sow Sow Sow Sow Sow S	ege
Preed.	Tannworth Bar Berkshire Sow Tannworth Bar Berkshire Sow Berkshire Sow Berkshire Bar Tannworth Sow Tannworth Sow Tannworth Sow Berkshire Sow	Average

The cost of the food consumed during the test was based upon the following market rates, ruling in July, 1929:—

Rough rice, £7 10s, per ton, or 0.8d, per lb. Wheat, £10 5s, 4d, per ton, or 1.1d, per lb. (5s, 6d, per bus.). Meat meal, £16 13s, 4d, per ton, or 2d, per lb. Salt, £4 13s, 4d, per ton, or \( \frac{1}{2} \)d, per lb. Separated milk, 2d, per gallon. Green feed, £1 per ton.

The following table shows the cost per pig of feeding each lot for the duration of the experiment (sixty-four days):—

		, } -	ot 1.	Lot 2.		
Foodstuff.	Price.	Consumed. Cost.		Consumed. Cost.		
Rice	2d. per lb 0.5d. per lb 2d. per gal	16 } 	£ s. d. 0 19 7 0 0 2 0 9 5½ 0 1 0	111	£ s. d.  1 3 2½ 0 0 2 0 9 5½ 0 1 0  1 13 10	

Food Consumed per Pig, and Cost of Feeding.

The total average cost of the rice ration was £1 10s. 2½d., and the ration resulted in a total average gain in live weight of 80.7 lb.; thus the cost of food per lb. of gain was £475d.

The total average cost of the wheat ration was £1 13s. 10d., and the ration resulted in a total average gain in live weight of 91.1 lb., thus the cost of food per lb. of gain was 4.461d.

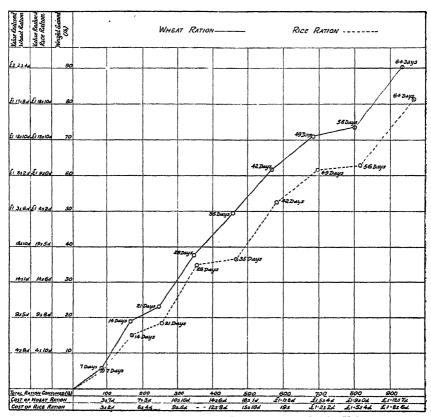
```
Lot 1.
                                                                                 Lot 2.
Assessed dressed weight of pigs at 21st August, 1929
                                                                           ... 61 16.
                                                             ... 67 lb.
Price of pork, 21st August, 1929
                                                            ... 9d. per lb.... 9d. per lb.
Average value of pig, 21st August, 1929
                                                            ... £2 10s, 3d.... £2 5s. 9d.
                                              ***
                                                     ...
Sydney price per pig, 29th October, 1929
                                                            ... £4 9s. 74d.... £4 8s. 74d.
Value of gain-market value less value of pig, 21st August, £1 10s. 4d.... £2 2s. 10d.
    1929,
Gains made
                                                            ... 81 lb.
                                                                           ... 91 lb.
Value realised por lb. gain
                                                             ... 5-82d, per lb. 5-65d, per lb.
```

The value realised per lb. gain equals the value of the gains made, divided by the number of pounds gained during the experiment. It was arrived at for each lot in the following manner:

As regards profits per lb. gain, one notes from the foregoing tables that for the rice ration the price realised per lb. gain is 5.820d., and the cost of food per lb. grain 4.475d., so that the profit per lb. gain is 5.650d., the cost of food per lb. gain 4.461d., giving a profit per lb. gain of 1.189d., which is an advantage of 0.156d. per lb. gain in favour of rice, i.e., 1s, 3.6d. per 100 lb. gain.

The graph illustrates primarily the relationship between the ration consumed per pig and the respective gains made.

Regarding the average pig as a basis, the graph shows for each ration: The weight gained, the value of weight gained, the weight of ration consumed, the cost of rations consumed, and the relative periods or weekly weighings of pigs as indicated in days.



Graph showing Relationship between Rations Consumed and Gains Made.

The positions of the points representing the numbers of days are plotted in accordance with the gains made and the amounts of foodsunffed, and are accurate only for the days shown. To plot the gains made and the amounts of ration fed for days between those shown it is necessary to divide the lines connecting the days shown into seven (and in the case of the last period into eight equal lengths. Even then the information so obtained would be approximate only, as it is unlikely that the gains made during any period remained constant from day to day.

One may deduce from the graph the relationship of the average weight gained per pig and the average value realised per pig to the average weight of food consumed and the average cost of food consumed per pig, also the relationship of the periods of feeding to the average cost of production, value realised, gains made and weight of food consumed.

It will be noted from the graph that though there are three depressed periods for Lot 1, there are two only for Lot 2. The extra period in the

former occurred during the fifth week, and though under daily observation, the pigs appeared and behaved normally. From the table it may be seen that the loss was uniform in the lot. The other two occasions were due apparently to food shortage and the pigs readily responded on increased rations.

#### Conclusions.

These apply only to this experiment, since the small number of pigs (nineteen) and the abnormal weather conditions do not allow of generalisations.

Rice was profitably utilised as a grain supplement with a small amount of meat meal fed with it.

Pigs in Lot 1 made lesser gains than those in Lot 2.

Pigs in Lot 2 made cheaper gains per lb. of food consumed than the in Lot 1.

Pigs in Lot 1 realised a greater price per lb. gain than those in Lot 2..

The difference in profits from the two lots was negligible.

The gains were proportionate to the total digestible nutrients of the rations.

Under market conditions obtaining in July, 1929, rice and meat meal is a more profitable supplement to separated milk than is wheat.

More time was required to prepare wheat than rice, but the same amount of labour in feeding both rations.

The pigs relished both rations with avidity.

The wheat ration induced a greater desire for cinders than the rice ration.

The pigs in Lot 2 appeared to maintain their bloom much better than did those in Lot 1.

No evidence of indigestion, digestive derangement or depraved appetite was noted with either ration.

The pigs on the wheat ration appeared more contented; those on rice ration more active.

The need for increasing rations in accordance with increasing weights was indicated on two occasions.

### "FARM AND INDUSTRIAL TRACTORS."

TRACTOR owners should find this book—Farm and Industrial Tractors, by D. N. McHardy—very useful in enabling them to get the best out of their tractors. The working of the internal combustion engine, driving, maintenance, and the manys ways in which tractor power can be unliked on the farm are all dealt with in non-technical language.

Mesers. Crosby, Lockwood and Son, publishers, London, forwarded the copy here reviewed.

## Pruning Irrigated Vines.

H. L. MANUEL, Viticultural Expert.

ONE still sees vines pruned under various so-called "systems" on our settlements, and it is unfortunate that people who have not had previous training, or who have not sufficient knowledge, give advice to those with even less experience, on the pruning of their vines. One often sees vines that have been more or less mutilated, and in other cases, vines which have been pruned to nondescript systems such as "hare's ears," while certain varieties, in other instances, which should be rod-pruned are pruned to a semi-spur and rod system which is varied somewhat from year to year.

At the outset one may say that the systems introduced into Australia by Professor Perkins many years ago, although a little modified in certain instances, still hold good, as they have proved most satisfactory under our Australian conditions. For average irrigation soil conditions, two systems,

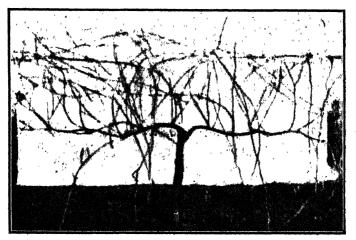


Fig. 1.-A Black Shiraz Vine Before Pruning on the Bordelais Spaller System.

namely the Bordelais Spalier and the Thomery Spalier—which are modified slightly to suit conditions—are recognised, and are the best to adopt. Of course it is only natural that the amount of growth the vines make under irrigation conditions, when manured and worked as they should be, is considerably more than that made by vines grown under what is known as "dry" conditions, and in consequence one is able to leave more fruit-bearing wood upon the vines at pruning time.

The Bordelais Spalier is adaptable for all varieties which bear their fruit mainly upon shoots which grow fruit buds other than those at the base; varieties fruiting as Black Shiraz does are pruned on this system.

The form the Bordelais system takes is two fairly short main arms, upon which are carried a series of spurs and rods, the number varying according to the strength of the vine. The spurs are always given, as much as possible, the choice of position at pruning time, for the main object in leaving the spurs is not so much to carry fruit, as to produce the wood for the following

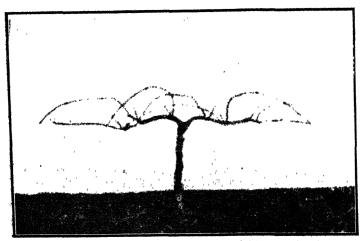


Fig. 2.—The Same Vine Pruned and the Rods Tied Down to the Wires.

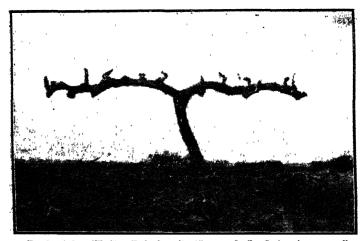


Fig. 3.—A Doradilio Vine Trained on the Thomery Spaller System (spur pruned).

season's fruiting; and so it is that one, in choosing a spur, can, if desired, use a watershoot, but it must be borne in mind that the rods, which are looked upon to carry the crop, should be growing from last season's growth. Figs. 1 and 2 show a vine pruned on the Bordelais Spalier system prior to pruning, and after pruning and tying the rods down to trellis wire, respectively.

The Thomery Spalier system simply consists of two main arms of varying lengths according to the strength of the vine, and upon these main arms spurs are placed at intervals from 6 to 8 inches. Varieties such as Grenache, Doradillo, Gordo Blanco, &c., are best pruned on this system. Fig. 3 is a spur-pruned vine which is strong in growth, and one which has carried equivalent to 8 tons of fruit per acre.

General information on the pruning of vines is given in Farmers' Bulletin No. 140, "Pruning the Vine," which is obtainable from the Department, price 10d. per copy posted, while growers who have particular problems may communicate with the writer or with Mr. N. D. Lackie, Superintendent, Government Viticultural Nursery, Griffith.

### "FUNGOUS DISEASES OF PLANTS."

TRANSLATED from the German by William Goodwin, this second edition of Dr. Jakob Eriksson's voluminous work, Fungeus Diseases of Plants in Agriculture, Horticulture and Forestry, is a notable contribution to the literature on plant diseases. The book presents, in a classified form, a general review of the more important fungous diseases in Northern and Mid-Europe, as well as giving the methods for prevention and control of those diseases. The research worker and student are further assisted by the lists of references which follow the chief groups of fungi and forms of disease. Altogether an excellent work of reference for the plant pathologist.

Our copy from the publishers, Messrs. Bailliere, Tindall and Cox, London.

### DENMARK'S AGRICULTURAL ORGANISATIONS.

AGRICULTURAL interests in Denmark are highly organised. The three main organisations are:—

(1) The Central Co-operative Committee of Denmark—a body representative of fifteen co-operative groups, each of which is an association of varying, but often of large numbers of local co-operative societies organised for different purposes, such as seed production, bacon curing, buttermaking, insurance, export trade, or the purchase of farmers' requisites.

(2) Associated Danish Agricultural Societies. These are national organisations with local branches, having a total membership of 115,000, mainly small farmers. The societies are chiefly engaged in educational work connected with their particular interests, and organise conferences and shows.

(3) The Royal Agricultural Society of Denmark, which is largely composed of estate owners and large farmers. With the aid of government grants the society supervises the work of advisers and animal experts. It also maintains an agricultural travelling bureau for demonstration purposes.

Representatives from these three associations are appointed to the Agricultural Council, a private body entirely free from State control, which watches over and furthers the interests of Danish agriculture.—Twelfth Report of the Imperial Economic Committee.

### A WARNING TO DAIRY FARMERS TO CHEESY CREAM.

In the case of a large number of creams graded "second class" and termed "cheesy," the "unclean" and "fermented" flavours have been found to be caused by a leak in the separator float.

The seam where the two sections have been soldered together is the most likely place for the leak to occur, and often these leaks are not perceptible to the eye. The most efficient way of finding the exact location of the leak is to place the float in a basin and pour boiling water over it so that a gas is formed inside the float, and the gas in trying to escape will force its way out through the hole, making a noise similar to that of a punctured tyre when immersed in water, and in this way the leak is easily detected. It might be mentioned that if it is immersed in cold water the leak will not be apparent as no gas will be formed and there would be no pressure inside to force the air out through the leak. The leak is usually apparent because of the formation of a brown deposit similar to rust around it, but to make absolutely certain it is desirable to apply the "boiling water test."

The best remedy for this defect is to purchase a new float, but, as an alternative, two large holes should be drilled in the top of the float, and the inside thoroughly cleansed with a very strong soda solution, followed by immersion in boiling water for ten minutes. It should be well drained and then heated to drive off all moisture and gas. Then solder it up and when the solder is properly set test it in boiling water again to see that the soldering has been effective.

Another cause of "cheesy" cream is the practice of stirring the cream with a wooden baton. In time, no matter how much care has been taken, it becomes saturated with cream. Anyone doubting this should break one of these batons where the cream has come into contact with it and the manner in which the wood has become infected will be apparent by sight and smell. The remedy in this case is to use an approved metal stirrer.—A. WALKER, Dairy Instructor.

### THE MOST ECONOMIC FARM UNIT ON MALLEE COUNTRY.

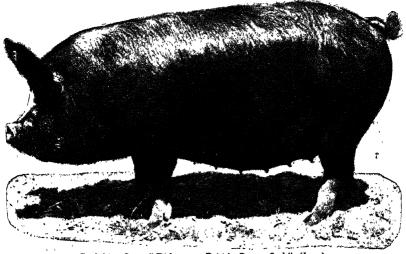
"I Am of the opinion," said Mr. E. S. Clayton, Senior Expermentalist of the Department of Agriculture, addressing the Sydney University Agricultural Graduates' Association, "that the most satisfactory way to determine areas is on a one-plant basis, and not on a one-man basis. If a large modern plant is used to capacity, there is every chance of producing wheat at the lowest possible cost per bushel, and the settler is in a better position to withstand a drop in the price of wheat, while he has a greater opportunity to make more money in good years and therefore should be better able to tide himself over a drought period than is the man on a bare living area."

Mr. Clayton's objection to the system to subdividing areas so as to provide just sufficient land to enable a farmer to make a living for himself, wife and family, was that it was not possible to calculate with any accuracy the profit that could be made from any specified area, as this varied from year to year, depending upon such fluctuating factors as the price per bushel of wheat, &c.

### DEPARTMENT OF AGRICULTURE

NEW SOUTH WALES

# STUD PIGS for SALE



Berkshire Sow, "Ridgemoor British Queen 2nd" (Imp.)

Stud pigs of BERKSHIRE and TAMWORTH breeds are available for sale at-

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### BERKSHIRE pigs only are available for sale at-

Grafton Experiment Farm, Grafton.
Bathurst Experiment Farm, Bathurst.
Wagga Experiment Farm, Bomen.
Glen Innes Experiment Farm, Glen Innes.
Cowra Experiment Farm, Cowra.

Breeders are reminded that at the above institutions the studs have been augmented by importations of the best and latest strains available of Berkshire and Tamworth pigs from Great Britain.

Full particulars regarding prices, &c., can be obtained on application from the Principal, Hawkesbury Agricultural College, Richmond, or from the managers of the farms mentioned.

G. D. ROSS, Under Secretary, Box 36A, G.P.O., SYDNEY.

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#### Orchard Notes.

JULY.

C. G. SAVAGE and W. LE GAY BRERETON.

Pruning can still be carried out on most of our deciduous fruit trees, with the exception of some varieties of stone fruit which start to blossom and shoot very early, such as King Edward VII and Bell's November peaches. In the Tableland districts pruning of most of the apples and pears can be continued till the end of August. However, it is always advisable to push this work through as fast as possible, for when delayed it interferes with other early spring operations. A free leaflet, "Pruning Deciduous Trees," is available for the asking, although the subject is more exhaustively dealt with in the book, "Pruning," which is now in its ninth edition. This book is also obtainable from the Department, the price being 3s., postage 3d. extra.

#### Ploughing.

Where the orchard has had an autumn ploughing, and if the land is still in a loose condition and practically free from weeds, ploughing can be delayed till nearer spring. But if it has not received an autumn ploughing or has become compacted again, or if weeds are fairly thick, then ploughing should be completed by the end of the month. Ploughing should also be completed by the end of this month if the land is carrying a green manure crop.

As has been pointed out in previous years in these Notes, a green crop must be turned under by the end of July to give it time to rot, and thus make the plant-food it has absorbed available again for the trees in early spring. Moreover, if ploughing is delayed the crop will exhaust, to a large extent, the soil moisture which has been stored up from the winter rains, and if a dry spring should follow the trees will suffer.

The bacteria which convert organic matter into humus require nitrogen, and very possibly phosphoric acid, in an available form. They cannot function in an acid medium, and in order to aid the formation of humus and to guard against the possibilities of locking up the nitrates and available phosphoric acid already in the soil to too great an extent in the early spring, it is advisable to make light dressings of sulphate of ammonia, superphosphate, and carbonate of lime when ploughing in green crops. If carbonate of lime is not easily procurable, lime should be slaked with water and scattered on the crop some weeks before applying the other fertilisers.

#### Planting.

Provided the ground is in good condition, planting of deciduous trees, except those that start early, such as the peaches already mentioned, can be continued this month. Though we prefer early planting, most apples and

pears can be planted up till the end of August in our Tableland districts if the land is in a suitable condition. "Laying-out and Planting : a Orchard" is the title of a free leastet on this subject, and those interested can obtain copies from the Department.

#### Citrus Packing Charts.

Harvesting will occupy most of the citrus grower's time for the next three or four months. Wall charts and diagrams for packing oranges, designed by Mr. R. J. Benton, are obtainable from the Department, and growers are recommended to write for copies.

#### Spraying.

Peach-leaf Curl.—Towards the end of this month, or early next month, peach and nectarine trees should be sprayed with lime-sulphur or Bordeaux mixture to control peach-leaf curl. Some of the very early blossoming varieties such as already mentioned should receive this application earlier. A leaflet on the treatment of leaf-curl is also available from the Department.

San Jose Scale.—In a general way, the Department has found miscible spray oil, diluted one part to twenty-five of water by volume, and applied at the end of winter before the trees start to shoot, more thorough than lime-sulphur for the control of San Jose scale. But at the same time some growers prefer the latter spray. If lime-sulphur is used for San Jose scale, care should be taken that it is mixed full winter strength and applied as late as possible just before the trees start into growth. It is preferable, for reasons explained later, to use lime-sulphur on apple-trees where the parasite Aphelinus mali is present.

#### Special Treatment for San Jose Scale.

Generally San Jose scale is first observed on a few trees scattered through the orchard, and it is worth while taking special measures to prevent it becoming widespread, as follows:—

Prune the affected trees early and place the prunings at once into the lighted burner, taking care when pruning these trees that the pest is not carried to clean trees by the pruner's clothes or pruning tools. The clothes should be washed or thoroughly brushed—not forgetting the hat—and the tools thoroughly cleaned with neat kerosene after completing the pruning of the affected trees and before they are allowed to come in contact with clean trees. The affected trees should then have a soaking application of miscible oil (one part to twenty-five of water by volume). As a soaking spray when applied to big trees takes a large quantity of spray, much of which collects in a pool at the butt and is liable to damage the bark at the collar at ground level, it is best, first to spray the butt, then to throw in soil round the butt, give the tree a soaking spray, and when the job is completed throw the soil which has collected the oil spray away from the butt into the centre of the row. As it is probable that the surrounding trees have a few specks of scale that have not been detected, the whole block of

trees, including those which have had special treatment, should receive a normal application of miscible spray oil (one part to twenty-five of water by volume) at the end of the winter and before they start into growth. With care, orchards in most localities can be kept free of San Jose scale, but once it becomes widespread it is very difficult to eradicate absolutely.

#### Woolly Aphis.

Fortunately since the introduction of the parasite Aphelinus mali, spraying for woolly aphis has become very much less necessary, but if in places the parasite has failed to keep down the woolly aphis, and it is necessary to check it, tobacco wash or nicotine sulphate should be used. Investigations carried out by the Entomological Branch of this Department have shown that neither nicotine nor lime-sulphur spray kills the wintering Aphelinus mali, but that oil sprays kill a large percentage. A leaflet on woolly aphis is available on application to the Under-Secretary, Department of Agriculture.

#### Diseases and Pests on the Irrigation Areas.

The following notes were supplied by Mr. G. W. Beveley, Senior Orchard Instructor, Griffith.

#### Collar Rot.

Care should be taken when working the ground close to citrus trees not to injure the bark near or below the surface of the ground with the hoe or other implements, as it is by way of such wounds that the fungus causing collar rot often enters. The union of the stock and scion is also sometimes a point of entry for the fungus, so that too deep planting favours the disease, as does also faulty irrigation or poor drainage.

Where collar rot is noticed, it is advisable to draw the earth away from the roots and leave them exposed to the air in order to dry out. Cut away all dry and apparently infected bark and paint with Bordeaux paste made as follows:—

Sulphate of copper		•••	•••	•••	•••	1½ lb.
Unslaked lime	•••	***	***	•••	•••	4 ,,
Water			***	***	•••	11 gallons.

Slake the lime and bring it to a pasty condition with part of the water, then allow it to cool. Completely dissolve the bluestone in the remainder of the water and mix the two substances together. The paste should, when properly mixed, become a pale turquoise blue.

A leaflet on the treatment of collar rot of citrus fruits can be obtained free from the Department.

#### Black Spot on Vines.

The winter treatment for this disease should be carried out after the vines are pruned, and certainly before the buds swell.

Spraying with a 10 per cent. solution of sulphuric acid has proved very effective, but there are few spray outfits that are wholly satisfactory, as it is necessary to have lead containers or washers, any other metal being soon eaten away.

For swabbing, a mop of old rags or binder twine may be used, and the formula for the swab is as follows:—

Sulphate of iro	n		•••	•••	•••	***	5 lb.
Sulphuric acid	•••	•••	•••	•••	•••	•••	pint.
Water			•••	•••	***		i galion.

Care must be taken in stirring the acid into the water, otherwise a severe burn may result.

The above treatment for black spot of grape vines checks the early development of the fungus, but if weather conditions favouring the disease occur, this treatment must be followed by sprayings with Bordeaux mixture. The blossoming period is often a very critical period in respect to this disease. A leaflet giving full details of the treatment of this disease can be obtained free of charge from the Department.

#### Green Peach Aphis.

Peach and nectarine growers who in the past have had difficulty in controlling green peach aphis should read with care the progress report of experiments carried out by the Entomological Branch, which was published in the *Agricultural Gazette* of April, 1930.

It has been found by the investigators that on the Irrigation Area the over-wintering eggs are laid on the peach trees during the early part of winter. These hatch out at the end of July or early August, and give rise to minute aphids, but it is not until the buds burst that these aphids breed rapidly and cause injury to the tree.

The spray which has been successful for two successive years is nicotine sulphate (40 per cent.) diluted 1 to 600 of water by volume, plus 1 lb. soft soap to every 25 gallons of spray. This spray will not kill the eggs, so its application must be made after all the eggs have hatched, but before the buds on the trees have burst. If delayed till after the buds have burst there is too much cover for the aphids and the spray will not be entirely successful.

Recognising that the limited period in which this spray can be successfully applied is a drawback, the Entomological Branch last season also tested ovicide sprays (sprays that would destroy the egg) with the object of lengthening the period during which the spray could be applied successfully. The most promising of those tried was a tar distillate introduced by Mr. W. B. Gurney, Entomologist of the Department, after his trip abroad.

The weaker dilution of tar distillate used (1 in 25) proved quite successful, but caused slight injury to the buds. However, it is probable that next season's field experiments will disclose a dilution of tar distillate that will kill the egg and cause no injury to the tree. For the present, growers are recommended to use the former spray, nicotine sulphate (40 per cent.) diluted 1 in 600, plus 1 lb. soft soap to every 25 gallons of spray, and applied after all the winter eggs have hatched, but before the buds have burst, i.e., just before the blossom buds show any colour.

If a grower wishes to try the tar distillate spray he is advised to do so on a few trees only, and not to use a stronger dilution than 1 in 30. This spray should be applied after all the eggs are deposited and while the trees are dormant. As it is reasonable to expect that the life-history of the green peach aphis will be similar in most of our inland climates, the same treatment should be effective there. It is important that growers should keep a careful eye on their peach and nectarine trees and observe when the eggs are deposited and when they hatch, for if the sprayings are not given at the correct times they will not be successful.

#### Codling Moth.

From 1st July all bandages should be removed from pome fruit trees, and if these are to be used again they may be dipped in boiling water, otherwise they should be burned. Clean up all old bark from the trees and burn it, and search all cracks and crevices of broken limbs for grubs.

#### IDENTIFICATION IS THE FIRST STEP IN WEED ERADICATION.

During the past six months the Department of Agriculture has been supplying country newspapers with illustrated articles on weeds, the main object being to educate the farmer to recognise any of the more important noxious weeds. Some twenty-five illustrated articles were contributed, and although the work and expense involved in supplying sterios of blocks to every newspaper requiring them have been considerable, there is much evidence that good work has been accomplished. Newspaper editors have expressed their thanks and have assured us that their readers have greatly appreciated the articles.

Some papers advised their readers to cut out and save the articles as they appeared each week, but it is safe to assume that these instructions were not generally followed, and consequently it is proposed shortly to publish the whole series in booklet form. Watch your local paper for notice of publication.

#### "ELEMENTARY PRACTICAL AGRICULTURAL CHEMISTRY."

To hand from Messrs. Robertson and Mullens Ltd., publishers, Melbourne, a copy of Mr. E. M. Jeiner's book with the above title. Mr. Jeiner, who is Science Master at Dookie Agricultural College, Victoria, wrote the book primarily for his own students, and it should prove a useful classwork book for teaching students of agricultural chemistry the underlying principles of analytical chemistry.

The book comprises four sections. Section 1 deals with the qualitative analysis of metals of agricultural importance; Section 2 with quantitative analysis; Section 3 outlines some simple experiments on substances of agricultural interest, such as water, milk, butter, soils. &c.; and Section 4 deals with the properties of certain organic compounds, including grape sugar, milk sugar, starch, cellulose, urea, casein, &c.

This 56-page book is retailed at 6s. by book-selling firms.

## Poultry Notes.

JULY.

V. H. BRANN, Acting Poultry Expert.

With the hatching season now commenced many who have not the necessary equipment to hatch their own chicks have placed their orders with poultry-farmers who cater for this trade. In many cases the chicks are ordered in one batch and in such numbers as to tax the full capacity of the brooders. A warning is necessary here, as the chickeus will require an increasing amount of room from time to time as they grow older. For instance, a brooder that will take a hundred day-old chicks will only comfortably accommodate fifty at five weeks old without risk of trouble. While it is very desirable to rear as many early chicks as possible, it is preferable to purchase the chicks in two batches rather than overcrowd them. The person inexperienced in the important work of rearing chicks is often too prone to neglect the making of adequate provision for the number of chicks he would like to raise. Beginners are also inclined to endeavour to raise all the layers they require in one season, whereas their equipment is only sufficient for half the number they attempt to rear.

Faulty broading not only incurs heavy losses in rearing, but stock reared under adverse conditions always develop into poorer layers than those reared under better conditions. Good and adequate equipment, together with the employment of sound methods in the rearing of the chicks, is the only way to enable the production of strong vigorous stock. To achieve good results in rearing poultry should be the first and most important aim of the poultry-farmer who wishes to be successful.

#### Empty the Yards for Growing Stock.

Growing stock will develop better if placed on clean and free range after they have been taught to roost. Moreover, there is the risk of disease and worm infestation if allowed on contaminated land.

Any of last season's stock that still remain in the yards should now be removed in order to give the enclosures at least three months' spell before the young stock are transferred to them. The ploughing up and growing of green crops in the yards does not achieve the object desired. The green crop, moreover, creates wet or damp conditions and in most cases restricts the range available, which is so desirable for growing stock. It is sufficient and more satisfactory to clean up the houses and yards and leave the surface exposed to the sunlight while awaiting the new season's stock.

#### The Care of Adult Stock.

Skilful attention to the adult stock will go a long way towards bringing them more rapidly into good condition, and consequently enhance profits.

Hens that are approaching two years of age have just passed through the moulting period and should be now giving an increase in production. Several instances have come under notice where the feed ration of layers that have fallen into moult has been cut down because it is thought that the birds will become too fat. This is a great mistake, but it will be noticed that a fowl in the moult will not consume as much food as a layer. It is very important that at this stage the flocks should receive all they require in order to bring them out of the moult as quickly as possible.

A profitable type of fowl will not "run to fat" if given a balanced ration. Indifferent methods also have caused many flocks to become unprofitable, and the owner, perhaps through financial stress, is apt to underfeed in order to cut down the feed bill. In these circumstances he would be much wiser to dispose of the poorer types, such as coarse or weedy and degenerate specimens, and pay more attention to the better class of stock. Underfeeding may mean heavy loss to the owner, just at a time when his profits should be increasing.

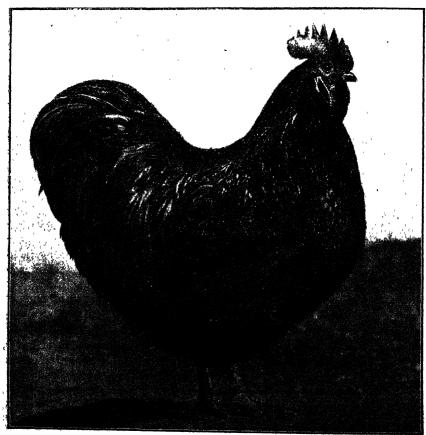
It is well to remember that any increase in production due to good treatment is extra profit obtained without incurring additional expense.

#### Good Housing Essential.

It is during the past three months that pullets have been the mainstay of production from the flocks. The expectation of laying during the autumn and winter from this stock depends upon development obtained in the rearing, housing and feeding. Climatic conditions can also cause some variance in the incidence of laying during these months, and pullets suffer more severely from adverse conditions and treatment than do the older stock. Indeed they may take longer to come into profit than the hens unless proper attention is given them. This explains why some flocks are kept at a total loss during the period when egg-laying is at its lowest point.

Unless ample provision is made for the housing and yarding of layers, indifferent results will be the certain consequences, irrespective of the quality of layers that are kept. There are several systems which are suitable for adult stock, but none more satisfactory than the semi-intensive. This system gives all the advantages that are claimed for both the free range and intensive systems. In rainy or cold weather the flocks can be shut in the house and allowed into the runs when the weather is favourable. from the fact that the layers do better, twice the number of birds can be kept in a semi-intensive house as compared with a house of the same size under intensive conditions. A useful size for the semi-intensive house is 22 feet long by 15 feet wide by 6 feet 6 inches high at the back and 8 feet 6 inches in the front. This will accommodate 150 layers. The yard space that is required is at least 2 square chains, and each yard should not be less than 1 chain wide. It is undesirable to build a very long house and partition it into three or more houses, which necessitates the erecting of long narrow runs, because the end of each yard near the house will become quickly fouled, whereas the other portion is scarcely utilised by the bens. Unless ample scratching material is provided in the semi-intensive house the real advantage of the principle is not gained. There is no purpose in having extra width in the house except to fit it up with scratching quarters in order that the birds can be kept in the houses when occasion arises.

The house with roosting room only is also satisfactory, provided that extra yard space is given. For 150 layers a house 30 feet long by 7 feet



Typical Black Orpington Cockerel.

wide by 6 feet high at back and 7 feet in front is required. The same building could easily be converted into a semi-intensive house if ever desired. The yard space required is approximately 100 square feet per bird, or a yard 100 feet by 150 feet for 150 layers. It may be necessary to alter the width and length according to the state of land available, but in any case each run should not be less than 1 chain wide.

All houses for layers should face the north, and it is preferable that the runs should be on the northern side of the house, to give them some protection from southerly winds. There is no objection whatsoever to the building

of double houses with a wooden or iron partition if the runs are allowed to extend beyond the ends of the building to give the necessary width.

The principle of grouping the various buildings in order to centralise the work is unsound. A congested farm is doomed to failure. It is very common to see farms of sufficient area, but with only a very small portion being utilised for what is expected to give the owner his living. If it is



Typical Black Orpington Pullet.

desired to increase the number of layers, and the area will not permit provision of space being made as suggested, it is preferable to give the range to the growing stock and keep the adult flocks in intensive houses.

Outbreaks of epidemics, particularly in the younger and most valuable stock, are more often traceable to faulty housing conditions than to any other cause. There is often an impression that the yards have become contaminated with disease, thus causing various troubles. This may be very true, but it would not have been the case had adequate space been provided.

#### The Typical Black Orpington.

Some time ago at the inauguration of the Bankstown Poultry Club, a poultry parade was held to select what was considered the most desirable type for the black orpington. As a result of this meeting, a large representative gathering recently visited the Government Poultry Farm, Seven Hills, and selected birds of the type illustrated. The Poultry Club of New South Wales will be asked to adopt as a standard the type chosen.

At the present time there is a very marked difference between the orpingtons exhibited as standard specimens and those kept on commercial poultryfarms. The type chosen is a good dual-purpose fowl—a very important qualification of the orpington—and proven from a utility point of view. It. conforms also to the original type intended for the orpington.

Unanimity as regards type for the standard and utility orpington is necessary for the preservation of the breed, and it is considered that should the present standard be modified it will do much to retain the orpington in its present popular position as a commercial breed.

A proposal to change the name of the breed from "Orpington" to "Australorp" was rejected.

#### HOW SUPERPHOSPHATE BENEFITS THE WHEAT PLANT.

Some interesting observations were made last season during the judging of the crop-growing competitions at Munyabla, near Henty, on the effect of superphosphate on the wheat plant, and the relation of the condition of the fallow to the action of the fertiliser.

An inspection on 1st August of a crop of Yandilla King that had been sown on 30th April with 70 lb. seed and 94 lb. superphosphate revealed a remarkable difference in the growth made by plants on a strip that had missed the manure and those on the remainder of the area. Up to this date the rainfall for the year had been 354 points. Average plants growing on each area were pulled up and compared. The manured plants had about twelve stalks to the stool and an 8-inch root system, while the plants that missed the manure, though only 3 feet away, had only one inferior stalk and a 2-inch root system.

This and other crops observed during the judging suggest that:

- (1) Superphosphate develops the root system, and helps the plants to withstand dry conditions.
- (2) On well-prepared, level, firm seed beds the grain germinates quickly and evenly, and the young seedlings obtain the benefit of the soluble phosphate in the fertiliser applied before it slowly reverts to the less soluble form, and so the young plants get "more of a kick" and a better start.
- (3) The better the conditions of the fallow the more superphosphate can profitably be applied.
- (4) The preparation of a high-class fallow should be the first consideration, for only under suitable conditions can maximum benefit be obtained from the fertiliser applied.—G. C. BARTLETT, Senior Agricultural Instructor.

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1st August, 1930.

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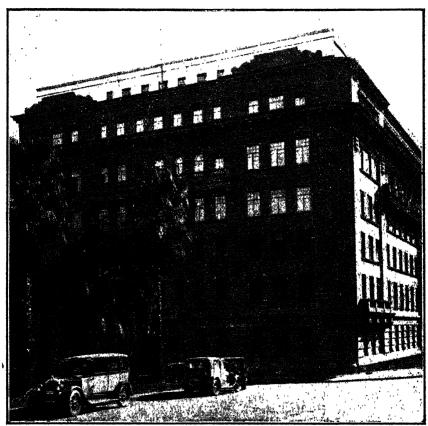
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Agricultural Gazette of New South Wales.

## The Department's New Building.

ALL BRANCHES NOW UNDER THE ONE ROOF.

THE Department of Agriculture is at last housed in its own building, and the inconvenience of having such an important Department of State as that of Agriculture scattered all over the city no longer exists. In addition to the Department's numerous branches, the new building also accommodates the Water Conservation and Irrigation Commission.



Department of Agriculture's Building, Raphael Street.

The change should prove of inestimable value in that it will make for the more efficient and economical administration of the Department, closer co-operation between experts and branches, added convenience to the general public, and a considerable saving in the matter of rents for private offices previously occupied by many of the branches. The accompanying illustration of the Department's new building supports our statement that it is a notable addition to Sydney's many fine public buildings. Special attention is directed to its exact location. Adjoining the Department of Education's building at the rear, it faces Raphael-street, which runs parallel to Bridge-street between Young and Loftus streets. The postal address is unaltered—Box 36A, G.P.O., Sydney.

So many branches being so widely scattered for so many years, it was only natural that some misconceptions as to the exact scope of the Department of Agriculture's activities should have arisen in the minds of the general public. Having regard to space limitations, those activities can best be indicated by giving a list of branches, experiment farms, etc., of the Department, and also a list of the numerous Acts administered, showing in the case of each Act the branch or officer responsible for its administration:—

#### Ministerial Office, Branches, Farms, etc.

Minister-The Hon. H. V. C. THORBY, M.L.A.

Under Secretary—G. D. Ross. Director of Agriculture—A. H. E. McDonald. Chief Clerk—E. F. Whitbread,

#### Branches, etc.

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College, Experiment Farms, etc.

Hawkesbury Agricultural College (E. A. Southee, Principal).

Veterinary Research Station, Glenfield (Dr. H. R. Seddon, Director of Veterinary Research).

Wagga Experiment Farm (H. Ross, Manager).

Bathurst Experiment Farm (R. G. May, Manager).

Cowra Experiment Farm (H. J. Kelly, Manager).

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Griffith Viticultural Nursery (N. D. Lackie, Superintendent).

Wauchope Apiary (W. H. Goodacre, Senior Apiary Instructor).

Yanco Rice Research Station (F. Matthews, Officer-in-Charge).

#### Acts Administered by the Department of Agriculture.

(The branch or officer administering the Act is shown in parentheses.)
Advances to Settlers (Government Guarantee) Act, 1929 (Government Guarantee Board).

Agricultural Seeds Act, 1921 (Agrostologist).

Apiaries Act, 1916-17 (Correspondence Branch).

Dairy Industry Act, 1915 (Dairy Branch).

·Farm Produce Agents Act, 1926 (Registrar).

Farrer Memorial Research Scholarship Fund Act, 1930 (Correspondence Branch).

Fertilisers Act, 1904 (Chemist's Branch).

Fruit Cases Act, 1912 (Export and Import Branch).

Marketing of Primary Products Act, 1927-30 (State Marketing Bureau).

Noxious Microbes Act, 1900 (Stock and Brands Branch).

Pastures Protection Act, 1912-18-20 (Stock and Brands Branch).

Plant Diseases Act, 1924 (Export and Import Branch).

:Registration of Stock Brands Act, 1921-23 (Stock and Brands Branch).

Swine Compensation Act, 1928 (Stock and Brands Branch).

Stock Act, 1901 (Stock and Brands Branch).

Stock Diseases Act, 1923 (Stock and Brands Branch).

Trustees of Showgrounds Enabling Act, 1909 (Legal Officer).

Veterinary Surgeons Act, 1923 (Stock and Brands Branch).

Wheat Act, 1927 (Grain Elevators Branch).

Wine Adulteration Act, 1902 (Viticultural Expert).

#### Broom Millet Seed.

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## Fodder Conservation Championship.S.

INLAND DIVISIONS AND GRAND CHAMPIONSHIP.

H. C. STENING, H.D.A., Chief Instructor of Agriculture.

THE Royal Agricultural Society's Championship Fodder Conservation Competitions in the inland divisions of the State were very successful, despite one of the most adverse seasons that has ever been experienced.

In consequence of the very deficient rainfall the season was most unfavourable to the production of fodder, and pasture lands for several months were denuded of grass, the result being that there was little opportunity to conserve fodder during the year, and furthermore heavy inroads had to be made into reserves stored in preceding years. Under the circumstances it was surprising that nine agricultural societies in inland districts were able to organise competitions. Three competitions were conducted in the central south-west division, two in the Riverina, and four in the northwest division. Unfortunately, there were no competitions organised in the middle-west division, where five competitions were held in the preceding year. The droughty conditions were more severe in the middle-west than in any other part of the State, and as a result fodder reserves were depleted to such an extent as to preclude the possibility of successfully conducting competitions. Almost generally throughout inland districts the rainfall has been abnormally low during the past three years, culminating last year in one of the driest seasons on record, and in many districts less than 1 inch was recorded for the first three months of this year. For lengthy periods pasture lands have been "as bare as a board," and stockowners have been obliged to hand-feed their stock. Under these circumstances, serious losses of stock might well have been anticipated.

The drought year of 1902 is the only one that can be compared with last year as regards lack of rain, the conditions last year being of even greater severity in that the two preceding years were also very dry. In 1902 serious losses of stock were experienced, the reduction in the number of sheep in the State exceeding fifteen millions, or 37 per cent. of the preceding year's total number of stock, but last year's statistics show that, instead of a reduction in the number of sheep, there was an increase at the end of the year of approximately 225,000 over the total number in the State at the end of the previous year. This result must be regarded as a tribute to the improved methods now practised by pastoralists and mixed farmers. Water conservation, rabbit control, the cultivation of fodder crops and pasture improvement have all played an important part, but fodder conservation has been the pivotal factor responsible for carrying the sheep over this protracted lean period without serious losses. No more convincing proof is required than the experience of the past year to emphasise the value of conserved fodders, and mixed farmers should not fail to profit by the lessons taught by adversity. In some instances, competitors had been hand-feeding their stock, with breaks of short periods, for a year, and still had sufficient fodder to continue feeding for several months longer.

The conditions and scale of points for judging the competitions were as follows:—

Fodders Eligible for Conservation to be:—Concentrates (including all grains); or roughage, as hay (e.g., lucerne, oaten, wheaten, barley, clover, grass), straw, or silage, and any other fodder suntable for conservation; to have been produced on the land owned, leased, or held on shares by the competitor. No farmer or grazier whose holding consists of less than 150 acres will be eligible to compete.

1.	Scale of Points for Judging—Areas other than  Suitability and Quality of Fodder  (a) Judged according to the suitability of fodder or combine		Points 60
	fodders for the purposes for which they are required  (b) Judged as to appearance, apparent palatability and n feeding values	25	
2.	. Location and Protection	• •••	45
	<ul> <li>(a) Locality—Location of the site, having regard to fire economy in feeding and general access</li> <li>(b) Protection—Protection from weather, pests, stock, fire, and</li> </ul>	10	
	deterioration	35	
3.	Economy of Production		15
4.	Carrying Capacity		60
	Quantity for requirements of competitor's holding to be based carrying capacity of the holding (when improved and under national The maximum amount considered to be competitor's requirement to be:—5 cwt. lucerne hay or its equivalent in feeding value (1 1½ cwt. cereal hay = 3 cwt. silage = 4 cwt. straw = ½ owt. gra	tural pasture ents per she cwt. lucerne	ō). ep
	Total		180

#### Central South-west and Riverina Championship.

The central south-west division was combined with the Riverina division for the purposes of the championship competition, the agricultural societies represented being Canowindra, Cowra, Grenfell, Narrandera, and Wagga. Judging was commenced on 5th and completed on 8th May, and resulted in the following awards:—

TABLE of Awards, Central South-west and Riverina Championships.

Society.	Competitor.	Suitability and Quality of Fodder.		8.	ation nd ection.	Economy of Production.	Carrying Capacity.	Total
		(a)	(b)	(a)	(b)	Ecol	Carr	
Canowindra	E. M. Finn and T. G. Murray, "Benevento," Canowindra	20	32	9	31	8	60	160
Murrumbidgee	W. R. Lyons, "Sackville," Wagga.	20	33	8	29	12	42	144
Narrandera	Sewell Bros., "Wannon Park," Sandigo.	20	28	8	27	12	47	142
Cowra	W. J. McSweeney, "The Rivers," Canowindra.	22	26	. 9	25	10	44	136
Grenfell	A. N. Freebairn, "Kings- wood," Greenethorpe.	20	31	8	29	12	19	119

The championship was won by Messrs, E. M. Finn and T. G. Murray, of Canowindra, the stored fodders consisting entirely of lucerne hay produced during the past summer on the renowned Belabula River flats. Included in the compact holding of 350 acres there are approximately 210 acres of these excellent river flats as well as 80 acres of upland soil sown with lucerne, the balance of 60 acres being natural pasture. There were altogether 420 tons of lucerne hay stored in a large shed in dive stacks, which was sufficient for the feeding of 1,680 sheep, which number exceeds the estimated carrying capacity of the holding when under pasture. The hay was well protected from deterioration, and its colour and general quality left nothing to be desired. The river flats enabled these competitors to reap a big advantage this year, for, fed by the underground water from the river, the deep penetrating roots of the lucerne rendered the crops independent of the rainfall; and although less than an inch of rain had been registered since the beginning of the year, the lucerne continued to produce satisfactory crops, and the absence of rain assisted in the production of an excellent quality of hay and permitted it to be stacked without damage. In consequence, there was a liberal margin of points between the champion and the runner-up.

The conserved fodders of Mr. W. R. Lyons, the second-prize winner, consisted chiefly of cereal hay. The area of his property is 850 acres, of which 420 acres were devoted to cereal crops, 115 acres under lucerne, 240 acres fallowed, and 75 acres pasture land. The fodder reserves were four stacks of wheaten hay containing 203 tons, one stack of oaten hay of 47 tons, 3½ tons of chaff, 9 tons of straw, and 8½ tons of grain (wheat and oats). This was sufficient for the feeding of 756 sheep, and thus falls a little short of regulation requirements. The quality throughout was excellent, the hay which was harvested last season was prime and of good colour; the stacks were well built and roofed, and all but one was on a timber foundation. The bags of grain stored in a shed had been dusted with flowers of sulphur, which Mr. Lyons has found to be effective in protecting the grain from damage by mice.

The third prize went to Messrs. Sewell Bros., the total area of whose property is 1,543 acres, of which 620 acres were last year sown with cereal crop, 300 acres were fallow, and 623 acres pasture. The fodders, which had been conserved since 1922, consisted of 219 tons of wheaten hay in four stacks, 201 tons of oaten hay in three stacks, 2 tons of wheaten chaff, and 10 tons of grain (wheat and cats). The total quantity of fodder, according to the competition standards, was sufficient for 1,205 sheep, whereas the carrying capacity was estimated at 1.543 sheep, and the fodder therefore was a little short of requirements. The quality of the fodder generally was good, but the stacks of oaten hay and one stack of wheaten hay showed evidences of slight damage as the result of mice infestation, and in the older stacks there was a little damage by rain. The stacks were well distributed over the holding, and were thatched, but a mistake had been made by building them on the ground without any timber foundation to prevent damage due to the rise of moisture from the ground into the stack.

#### North-west Championship.

Four societies in the north-west division organised competitions, namely, Gunnedah and Wee Waa Agricultural Societies, the Boggabri Sub-district Council of the Agricultural Bureau, and the Manilla Farmers and Settlers' Association. It was the initial effort of the Wee Waa and Manilla societies, and the former has the distinction of carrying off the championship at its first attempt. Judging occupied three days, from the 20th to the 22nd May, and the following are the details of the awards:—

Table of Awards, North-west Championship	TABLE	of	Awards,	North-west	Championships
------------------------------------------	-------	----	---------	------------	---------------

Society.	Competitor.	Qua.	ability nd lity of dder.	a	ation nd ection.	Economy of Production.	ing teity.	Total.	
		(a) (b)			(b)	Economy Productic Carrying Capacity.			
Wee Waa	G. F. Gray, "Hawthorne." Wee Waa.	17	31	9	32	12	60	16 <b>t</b>	
Boggabri	S. K. Rabbitts, "Nande- war," Boggabri.	21	29	8	29	13	29	129	
Gunnedah	F. C. Foster, "Garnock," Gunnedah.	18	26	8	30	14	29	125	
Manilla	H. V. Dowe, "Warongah," Manilla.	22	. 28	9	30	13	16	118	

Much credit is due to Mr. G. Gray for winning the championship with such a large margin of points. His reserve of fodder consisted entirely of cereal hay, both oaten and wheaten, of which there was a total quantity of 431 tons. The whole of the hay was stored in four large hay sheds, and the bulk of it was in bales. It was surrounded by 10-feet galvanised iron, thus affording protection against stock, rats, mice, and weather. The quantity of fodder was a little in excess of that required for providing nine months' ration for the 1,102 sheep which the property of 1,876 acres was estimated to carry if the whole were under pasture. The hay had been harvested during the 1928 and 1929 seasons, and the quality throughout was excellent. Points, however, were lost by reason of the lack of variety of fodders, and especially of lucerne hay for the provision of a balanced ration.

The cup for second prize was won by Mr. S. K. Rabbitts, whose property at Boggabri is 2,500 acros in area, and was estimated to carry one sheep per acre. The greater portion of the fodder was silage of good quality, conserved in nine pits, from crops of Sudan grass and Saccaline grown in 1927, totalling in all 690 tons of silage. In addition there were 82 tons of baled hay in a stack built on the ground, but thatched and fenced against stock, 10 tons of lucerne hay in two small stacks, 7 tons wheaten chaff, and 3 tons Sudan grass chaff. The full amount of fodder was a shade less than half the requirements for the total sheep the property is capable of carrying.

The fedder conserved by the third-prize winner, Mr. F. C. Foster, of Gunnedah, was chiefly oaten silage stored in two pits, estimated at 287.

tons. There was also 6 tons of oaten chaff and 8 tons of oats and barley grain. Mr. Foster is a firm believer in the value of the oat crop for the production of fodder for grazing by sheep and for conservation. The total quantity of fodder was not quite equal to half the requirements for the feeding of 2,500 sheep, which was the carrying capacity of the holding.

#### Grand Championship Competition.

In previous years difficulty was experienced in that once a competitor had won a championship competition he was at an advantage by reason of the reserves of fodder he had accumulated, and was well on the road to winning succeeding competitions. This had the effect of limiting entries, and an attempt was made last year to bridge the difficulty by limiting the fodder eligible for the competition to that which had been conserved for no more than four years. This, however, proved unsatisfactory, as it penalised the genuine conserver of fodder who stores a little each year and gradually accumulates a drought reserve, which is well protected and not utilised until the emergency arises. While it was realised that competitors who had been successful in previous competitions were fin some measure responsible for limiting the number of entries, it was still considered undesirable to debar them from competition altogether, its their example was such an outstanding object lesson to stockowners generally. The idea was therefore conceived of rendering ineligible for the championship competitions those competitors who had won two previous championships, and providing for a grand championship in which they ('ould compete against the winners of the championship competitions in cach division.

This year, Mr. Anthony Brunskill, of "Allonby," Wagga, who had won two previous championships, competed with this year's district champions for the supreme honour of grand champion of the State. The awards were as follows:—

Competitor.		Suitability and Quality of Fodder.		ction.	Reonomy of Production.	ng apacity.	1	
	(a)	(b)	Location	Protection	Beon	Carrying	Total.	
G. F. Gray, "Hawthorne," Wee Waa E. M. Finn and T. G. Murray, "Bene- vento," Canowindra. A. Brunskill, "Allonby," Wagga	17 20 24	31 32 33	9 9 8	32 31 32	12 8 13	60 60 22	161 160 132	

TABLE of Awards in Grand Championship.

Mr. Gray won the distinction of "Champion of Champions" by the narrow margin of one point. It is fitting that this honour should be attained by the son of one of the first stockowners in this State to demonstrate the conservation of fodder by storing silage in pits.

Mr. Brunskill can be regarded as the greatest exponent of the practice of fodder conservation in the State, and his example has been an inspiration to many stockowners. The hand-feeding of his sheep over a prolonged period has imposed a heavy drain on his reserves of fedder, and coupled with the fact that, owing to the severity of the season, it has not been possible for him to conserve any silage for three years, the quantity of fodder submitted for judging was considerably less than it has been for many years. It requires an enormous amount of fodder to provide for the sheep on Mr. Brunskill's property of 5,045 acres, and the fodders on hand at the time of judging were eight stacks of cereal hay containing 460 tons, four stacks of lucerne hay of 62 tons, one stack of lucerne and trefoil hay of 27 tons, three pits containing 522 tons silage, 10 tons baled oaten hay, and 5 tons chaff, sufficient in all for feeding 2,319 sheep for the regulation period of nine months. He was awarded highest points in the competitions for the quality and combination of fodders and for their protection.

#### General Comments.

As the judging was carried out in the middle of a most severe drought and hand-feeding had been proceeding in some cases for many months, the amount of fodder submitted by each competitor was most creditable, even though only two competitors had sufficient fodder for feeding their sheep for the stipulated period of nine months.

Half of the competitors had stored fodder in the form of silage, and it is rather surprising that this method of conserving fodder is not more generally adopted, for not only can fodder be conserved more cheaply and safely than in any other form, but silage is so eminently suitable for feeding stock during periods of drought owing to its succulence and laxative properties.

There was ample evidence in this competition that the stack method of conserving silage is most uneconomical owing to the excessive amount of waste, as much as 30 per cent. being spoiled by the development of mould and the drying out at the top and sides of the stack as the result of exposure. The monetary value of the silage thus wasted was much higher than the cost of excavating pits to held an equal amount of silage, and the pits would be available for years. In inland districts the pit silo is undoubtedly the best means for conserving fedder, for once the pit is filled and covered the fodder is safe from damage by weather, fire, stock, mice, and other pests, and there are no expenses for insurance. In some instances the amount of waste as the result of development of mould in the top layers of silage in the pits was greater than necessary if care had been taken not to permit the fodder to dry out before covering. If the filling of a pit is completed quickly, too long a period is necessary to allow the fodder to settle before covering, and there is a danger of the surface fodder drying out, with the result that mould develops and the upper layers of silage are spoiled. To avoid this, intervals should be allowed for settlement during filling, but never long enough to allow the fodder to dry,

and pressure should be applied to the fodder by driving the loaded waggons into the pit and over the pitted fodder. If the fodder is stacked to a height above ground level equal to the depth of the pit, the fodder could be covered before it has time to dry out at the surface and there will be no danger of the material sinking below ground level and leaving a depression. It is an advantage to have two pits, so that filling may proceed in one while the fodder in the other is settling.

Half of the competitors made cereal hay the basis of their conserved fodders. Wheaten and oaten hay fill a very important place in the list of suitable fodders, but require a greater expenditure in their conservation to ensure adequate protection from deterioration as the result of damage by weather, stock, and rodents, and it is also necessary to insure against loss by fire. Cereal hay is deficient in protein and it is gratifying to note that more attention is being given to the conservation of lucerne hay, which assists in providing a balanced ration.

The areas of the properties of competitors varied from 350 acres to 5,045 acres, which indicates that the scale of points provides an equitable basis for competition by both small and large landholders. As there has been criticism that the large landholder is at a disadvantage by reason of the large quantity of fodder that would be necessary, it is interesting to note that the properties of half of the competiors exceeded 1,500 acres, and that each of six competitors, after heavy inroads had been made on the reserves, still had sufficient fodder for feeding over 1,100 sheep on a full ration for the period of nine months.

The competitions have done much in focussing the attention of stockowners on the necessity for conserving fodder as an insurance against lean periods, and the measure of support that has been given to the competitions in such an adverse season augurs well for the future success of the competitions on the return of favourable seasons.

#### RAINFALL AND WHEAT YIELDS.

In considering the effect of rainfall on wheat yields it is important to consider the distribution of the rainfall together with the plant's requirements at different times. Australian investigators have shown that wintersown wheat adds to its dried weight at an increasing rate for the first four months, while the maximum rate is reached when coming into ear in early October, from which time onwards the rate of increase decreases until harvest. It is necessary that the plant foods in the soil should be in an available form to meet this increasing rate of growth, and therefore the presence of moisture can be taken as being particularly necessary a little before this period of maximum increase. This indicates to some extent why the August-September rainfall is such a dominant factor. It would seem that the greater the amount of rain received in August and September the heavier the ultimate yield, provided, of course, that the rain is not sufficiently heavy or continuous to cause damage in other directions, such as by favouring rust, water-logging the soil, etc.—E. S. Clayton, Senior Experimentalist.

### Field Maize Competitions.

ROYAL AGRICULTURAL SOCIETY'S CHAMPIONSHIPS, 1929-30.

L. S. HARRISON, Special Agricultural Instructor.

MAIZE-GROWERS may improve their crop yie'ds by giving particular attention to cultural details, both before and after planting, by the use of well selected seed of varieties suited to their requirements, and by the control of disease. That the value of information on these essentials to success is being increasingly realised is evidenced, not only by the larger number of societies which competed this year for the Royal Agricultural Society's Championships, but also by the many entries which were received by the competing societies. In some parts of the State a few societies yet remain outside the championship competitions, but every year further districts are added to the ranks, and it is confidently anticipated that growers in all areas where maize-growing can be regarded as a commercial project will eventually realise the advantages to be gained from these competitions.

The Royal Agricultural Society this year provided thirteen cups for maize competition purposes, and by such action indicated how great a stimulus to the improvement of maize-growing generally these competitions are considered. The State was again divided into five sections for championship purposes, and in all sections, except the North and Central Coast, there was an increase in the number of competitors.

The actual representation of societies this year was:—North Coast—Kyogle, Grafton, Bellingen and Dorrigo; Central Coast—The Macleay, Manning and Hawkesbury Rivers; New England and the North-west—Tenterfield, Glen Innes, Armidale, Uralla and Inverell; Tumut and Gundagai—those two societies; and the South Coast—Eden, Pambula, Candelo, Bega, Cobargo, Bodalla, Moruya, Kangaroo Valley and Camdén.

Latterly an increase in the use of maize grain for feeding to farm stock has been noted; this is a practice that must be commended, and its adoption could well be urged upon maize-growers wherever such a system of feeding is possible. The value of the grain when fed to stock is very frequently greater than what would be received from open marketing returns, and there is reduced expenditure in handling.

Growers and users of grain, where they are able to make the necessary provision, can decidedly advantage themselves by instituting some satisfactory method of maize storage, preferably in tanks.

Maize for green feed and silage purposes, must always hold its place, for there is no other crop of equal tonnage to the acre that affords so nutritious a bulk for all general stock purposes.

#### The North Coast Championship.

Messrs. Carle Bros., of Raleigh, came first in this competition with a crop of Fitzroy, which was grown on an excellent type of alluvial land that had been under cultivation for three years, and last year had carried a crop of Saccaline. The first ploughing was made early in July, after which the land was disc cultivated three times, harrowed, ploughed, disced and harrowed. Planting was carried out early in November in rows 4 feet apart, and two



Messrs. Carle Bros.' Crop of Fitzroy.

or three grains every 2 ft. 9 in. After planting the soil was scuffled, the centres were lightly cut out with a plough and re-scuffled. Superphosphate at 13 cwt. to the acre was used, and the yield promised, as will be seen from the points, was particularly high. There was a trace of root and stalk rot in the crop. The seed of this entry had been soundly selected, although type left a little to be desired, compared with the very highest Fitzroy standards.

The second prize crop was entered by Mr. J. T. Pratt, of Kyogle. This was also a crop of Fitzroy, and was grown on alluvial soil with a frontage to Findon Creek, on the Upper Richmond. paddock had been under cultivation about sixteen years,

six of which it was under lucerne. Oats was the crop prior to maize. The paddock was ploughed in November, harrowed twice and reploughed in December, planting taking place about the end of December, in rows 4 feet apart with three grains every 32 inches. After planting, the crop was scuffled twice and disc hilled. The Fitzroy showed distinct signs of quality.

Mr. A. E. Ellem, Carr's Creek, Grafton, came third with a crop of Leaming. This was planted on alluvial land which had been down to lucerne for some time, and which had grown potatoes just prior to the crop of maize. It was ploughed in November, rolled, harrowed, ploughed and rolled again; the erop was planted in the middle of December in rows 4 ft. 2 in. apart with three grains every 3 feet. After planting the land was scuffled twice, plough

hilled and the centres cleaned out. The type of this variety was not altogether satisfactory. It had its points of resemblance to Broad Learning, a variety which is in favour with some Clarence River growers, but it showed too much variation from purity and admixtures with other varieties.

Messrs. Coghlan and Spokes, Dorrigo, entered a crop of Manning Silvermine on land that had been forty years under cultivation, the preceding crop being maize. Ploughing took place in October, and the crop was planted at the end of November, in rows 3 ft. 6 in. apart with two or three grains every 26 inches. Paddy's Plains, the locality in which this crop was grown is a very fertile piece of country, and produces many satisfactory crops; this one was estimated to yield 80 bushels.

The following were the points awarded in the North Coast Championship:—

NORTH COAST Maize Championship.									
		Points awarded.							
Competitor and Variety.	Gleanness of cultivation. (Max. 20 points.)	Germination or stand. (Max. 10 points.)	General appearance and condition, evenness, &c. (Max. 10 points.)	Freedom from insect pests and diseases. (Max. 10 points.)	Purity and trueness to type. (Max. 15 points.)	Estimated yield.*	Total.		
Carle Bros., Manor Farm,			0.7	-,		0.0	00		
J. T. Pratt, Roseleigh,	18 <del>1</del>	8	81/2	$7\frac{1}{2}$	11½	36	90		
Kyogle (Fitzroy)	19	8 <u>1</u>	81	9	11½	30	86 <u>≱</u>		
A. E. Ellem, Carr's Creek, Grafton (Leaming Type) Coghlan and Spokes, Paddy's	19	9	9	· 7½	8	33	85 <u>1</u>		
Plain, Dorrigo (Manning Silvermine)	19	8 <del>1</del>	9	71/2	10	24	78		

NORTH COAST Maize Championship.

#### The Central Coast.

Mr. E. H. Ducat, of Temagog, Macleay River, again won the championship on the Central Coast, repeating his success of last year. Mr. Ducat's entry was of Fitzroy, which indicated close attention to seed selection, as it carried most of the characteristics of the variety. There were, however, slight indications of interpollination. The land on which the crop was planted is old in cultivation, but has been frequently rejuvenated by heavy flood deposits. The previous crop grown was maize. Ploughing for the competition crop took place in June, and the land was harrowed and cultivated, then reploughed, and the crop planted the first week in October in rows 3 ft. 9 in. apart, with three or four grains every 20 inches. Superphosphate was used at 2 cwt. to the acre. After planting the crop was cultivated four times and hilled with a plough.

<sup>\*</sup> Three points for every 10 bushels of apparent yield.

The second prize cup was won by Mr. P. J. Mooney, Dumaresq Island. Taree, with a crop of Hickory King. Mr. Mooney is also on very fertile land which is occasionally enriched by flood deposits. This was the first crop of maize planted since recent heavy deposits. The land was ploughed in April, later reploughed twice, and received alternately three discings and three harrowings. Planting took place in the end of September in rows 3 ft. 3 in. apart with four or five grains every 30 inches. Superphosphate was used at  $2\frac{1}{2}$  cwt. to the acre. After planting the crop was scarified twice, hilled and middled. It will be noted that Mr. Mooney planted his crop fairly thickly, but on this river, the practice has sometimes resulted in heavy yields, and it did so in this instance; Mr. Mooney's action indicated a knowledge of crop cultivation requirements, and he suited his methods to the immediate needs.

Messrs. K. and H. Gow, Windsor, came third with a crop of Yellow Hogan. This was planted on alluvial land which had carried two or three crops of maize, after having been under pasture. Ploughing took place in July, after which the land was harrowed, rolled, ploughed, rolled and harrowed, and planted early in October. The seed was sown in rows 4 ft. 6 in. apart with two grains dropped every 15 inches. Superphosphate was used at 1½ cwt. to the acre. After planting the crop was rolled, scuffled twice and hilled, and the centres cleaned out.

The three championship competitors in the Central Coastal district showed a high standard in general cultural methods, choice of variety and in seed selection. The cultural preparation had been adapted to requirements in each case, and the results were particularly gratifying from a competitive point of view since, in each case, an excellent crop represented the district.

The following were the points awarded in the Central Coast Champion-ship:-

CENTRAL COAST Maize Championship.

	_							
	Points awarded.							
Comp titu and Variety.	Cleanness of cultivation. (Max. 20 points.)	Germination or stand. (Max. 10 points )	General appearance and condition evenness, &c. (Max. 10 points.)	Freedom from insect pests and diseases. (Max. 10 points)	Parity and trueness to type. (Max. 15 points.)	Estimated yield.*	Total	
E. H. Ducat, Inglebrae, Temagog (Fitzroy)	18 <del>1</del>	9	8 <del>1</del>	71	11	36	901	
King)	17	8 <del>1</del>	8 <del>1</del>	8 <del>1</del>	111	33	87	
K. and H. Gow, Cornwallis, Windsor (Yellow Hogan)	18	71	9	7	10 <del>1</del>	251	774	
		-		1				

#### The South Coast Championship.

On the South Coast this year an additional number of societies entered for the field maize championship competition, and it is gratifying to note that the number is now approaching the maximum. Maize-growing is a widely adopted farming pursuit on the South Coast, and a large percentage of the maize produced is utilised on the farm, this showing a keen appreciation of its merits as a stock feed.

The winning crop entered by Mr. A. E. Scott, of Bega, was an exceptionally heavy yielding area of Funk's Yellow Dent, and the yield allotted to this crop—140 bushels to the acre—is one that would not disgrace any paddock in the State. The paddock had been under lucerne for nineteen years; it was ploughed deeply in August, and was harrowed, ploughed and harrowed again. Planting took place early in October with rows 3 ft. 8 in. apart, and



A South Coast Crop of Hickory King.

one or two grains every 14 inches. After planting the land was cultivated twice. The fact that this crop followed lucerne is significant; maize following a leguminous crop is always distinctly advantaged thereby. The Jellat Flats, where the crop was grown, are well known for their very high fertility and ability to produce exceptionally profitable crops of maize. The type of seed used was good, but further selection is necessary to improve this seed to an even better standard.

The winner of the second prize was Mr. James Graham, of Barrengarry, Kangaroo Valley, who entered a crop of Hickory King planted on a sandy alluvial soil which had been under cultivation about fifty years. The previous crop was maize; the land was ploughed in July, and it was harrowed and reploughed prior to sowing in October. Seed was dropped by hand in rows a little over 3 feet apart with two grains every 18 inches. After planting the

area was scuffled four times and hand chipped. Superphosphate was used at 2 cwt. to the acre. This was a very good crop, which had responded well to the treatment given it by Mr. Graham. The seed was a little off type for Hickory King, but appears to suit the district, having been grown there for some time. The yield was very good indeed, and it will be noticed that the crop was planted very thickly in the paddock.

Mr. A. L. Mitchell, Lower Towomba, came third with a crop of Golden Beauty, grown on old alluvial cultivation land, which had last year grown a crop of maize, which had been grazed down with pigs. The paddock was ploughed in August and harrowed twice before planting towards the end of September. Rows were 3 feet apart with two or three grains dropped every 20 inches. After planting the land was rolled, harrowed twice, cultivated twice and hand hoed. The type of Golden Beauty used showed considerable variation from the true variety, having been developed into a much larger cob and showing unevenness in maturity. Maize is grown primarily for pig grazing in this district, and growers are naturally inclined to use varieties suitable to the purpose, and in this locality Golden Beauty is one that finds considerable favour on that account. This entry indicated very high yielding possibilities, and was a well grown and well handled crop.

Two entries tied for fourth place. Mr. J. Bruchhauser, of Camden, submitted a crop of Fitzroy grown on sandy alluvial soil which had been six years in cultivation. The soil was ploughed for this crop in June, and was harrowed, re-ploughed then harrowed and rolled, and the seed planted the first week in October. P.B. 6 fertiliser was used at  $1\frac{1}{2}$  cwt. to the acre. Smut was present in this crop, and penalised the entry under that heading. The sample of seed was good, and with careful selection excellent seed could be secured. Mr. H. Jeff Bate, of Bodalla, who tied with Mr. Bruchhauser, entered a crop of Fitzroy grown on land that had been reploughed two years after being out to pasture. The crop was planted in October, following a June ploughing, and the necessary cultivations. Superphosphate was used at 2 cwt. to the acre, and the rows were 3 ft. 6 in. apart with three grains every 28 inches. The type of Fitzroy used was good, and fairly true to the variety, although there was a slight admixture with other varieties.

Mr. J. R. Milne, Moruya, submitted a particularly well selected and true-to-type entry of Funk's Yellow Dent, which secured highest points under that heading in the South Coast championship. Messrs. Hayward Bros., of Pambula, came next with a crop of Funk's Yellow Dent grown on an old paddock which was planted to potatoes prior to this crop, and was fertilised with 2 cwt. of superphosphate to the acre, together with 4 tons of farmyard manure. Mr. J. H. Tarlinton, of Cobargo, entered Hickory King, which he had selected to his own requirements for many years. This crop was planted on land that had been out to pasture for a few years previously, which was disced up in September, and planted towards the end of October. Messrs. Moffitt Bros, of Candelo, also submitted a crop of Hickory King. This

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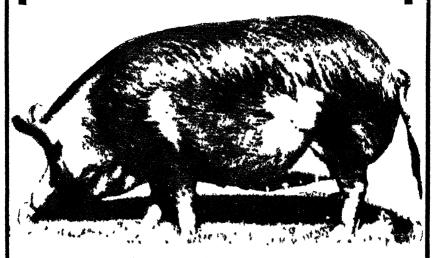
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#### DEPARTMENT OF AGRICULTURE

NEW SOUTH WALES

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entry had been particularly handicapped by the fact that it was grown on hill land, and the weather conditions in the locality were most unsuitable for the production of good crops on that class of country.

The awards in the South Coast championship were as follows:-

#### SOUTH COAST Maize Championship.

	Points awarded.								
Competitor and Variety.	Cleanness of cultivation. (Max. 20 points.)	Germination or stand. (Max. 10 points.)	General appearance and condition, evenness. &c. (Max. 10 points.)	Freedom from insect pests and diseases. (Max. 10 points.)	Purity and trueness to type (Max. 15 points.)	Estimated yield.*	Total.		
À. E. Scott, Bega (Funk's Yellow Dent) J. Graham, Kangaroo Valley	$16\frac{1}{2}$	91	$9\frac{1}{2}$	8	101	42	96		
(Hickory King) A. L. Mitchell, Eden (Golden	19	9	9	9	9	36	91		
J. Bruchhauser, Camden	18	9	91	8	9	36	89½		
(Fitzroy) H. Jeff Bate, Bodalla (Fitz-	19	8	9	6 <del>1</del>	111	27	81		
roy) J. R. Milne, Moruya (Funk's	16½	9	91/2	81/2	10 <del>1</del>	27	81		
Yellow Dent) Hayward Bros., Pambula		8 <del>1</del>	9	8	12	24	79 <u>1</u>		
(Funk's Yellow Dent) J. H. Tarlinton, Cobargo	15½	91	9	7 <del>1</del>	9 <del>1</del>	27	78		
(Hickory King) Moffitt Bros., Candelo	18	9	81/2	9	9	21	741		
(Hickory King)	171	9	9	8 <del>1</del>	10 <del>1</del>	9	63 <u>1</u>		

<sup>\*</sup> Three points for each 10 bushels of apparent yield.

#### The Tumut-Gundagai Competition.

The Tumut-Gundagai Championship Competition is necessarily restricted to these two societies, and the Royal Agricultural Society donates one cup for competition between the two entrants.

Mr. James Bach, of Gilmore, represented the Tumut district with a crop of Murrumbidgee White. The land which had been under curtivation for about twenty years, was ploughed in October, harrowed three times, rolled, cultivated twice. Planting was carried out at the end of October, three grains being dropped every 3 feet in rows approximately 3 ft. 10 in. apart. The area was harrowed three times and hand worked as required. Certain local rainfalls advantaged this crop, but on the other hand the preparation had been well thought out, and the detail of the cultural requirements well considered. A distinct advantage in ordinary times would have been gained had ploughing taken place considerably earlier. The seed of the variety, Murrumbidgee White, was quite satisfactory, showing a distinct uniformity of type and character, and the crop throughout was particularly free from disease. This entry won the cup for the division by a fairly substantial margin.

Mr. J. Corkhill, of Terrabandra, Gundagai, was the representative for that society with a crop of Murrumbidgee White. This land, which had been under cultivation about nine years, was ploughed in September, harrowed, rolled, reploughed, disced and planted at the end of September, two or three grains being dropped every 3 feet in rows 3 ft. 6 in apart. The area was later disc cultivated twice. This crop promised a satisfactory yield, but considerable variation in type was shown throughout. Very little disease was found.

The awards in this district were as follows:-

TUMUT	and	GUNDAGAI	Championship.	
				-

	Points awarded.								
Competitor and Variety.	Cleanness of cultivation. (Max. 20 points.)	Germination or stand. (Max. 10 points.)	General appearance and condition, evenness, &c. (Max. 10 points.)	Freedom from insect pests and diseases. (Max. 10 points.)	Purity and trueness to type. (Max. 15 points.)	Estimated yield.*	Total.		
J. Back, Gilmore (Murrumbidgee White) J. Corkhill, Terrabandra (Murrumbidgee White)	18 16 <del>1</del>	8 <del>1</del> 7	8 8 <del>1</del>	9	12 9 <del>1</del>	42 30	97 <u>‡</u> 80 <u>‡</u>		

<sup>\*</sup> Three points for every 5 bushels of apparent yield.

#### New England and Inverell.

In this division there was a full representation of all the societies in maize-growing districts.

The winner, Mr. J. Pedlow, of Stonehenge, Glen Innes, entered a crop of Wellingrove grown on black soil which had been twenty years under cultivation, oats being the crop prior to the maize entered. Ploughing took place in April, and the land was harrowed once and cultivated four times. The crop was planted at the end of October on the square 3 ft. 10 in. apart. After planting five cultivations were given. The type showed a little variation, and departure from the best characteristics of the variety, but with close selection some excellent seed would be secured.

Mr. J. A. Duff, Cooredulla, Tenterfield, came second with a crop of Learning, grown on old land that had been newly cultivated. Planting took place early in October after the paddock was ploughed, harrowed twice, cultivated and reploughed. The rows were 3 ft. 9 in a part, and one grain was dropped every 12 inches. The Learning variety used by Mr. Duff showed some variation from the accepted coastal type, but now appears to have been acclimatised and selected to suit Mr. Duff's conditions. It showed only fair uniformity, and there was a certain variation to his type.

Messrs. O'Dea Bros., Tilbuster, Armidale, came third with a crop of Large Goldmine, planted on a black semi-alluvial soil which had been under

cultivation about fifty years, but which had been without a crop the year prior to the competition one. Ploughing took place in July, and the land was harrowed twice and reploughed in October. The seed was sown in the middle of October in rows 3 ft. 6 in. apart, with three grains every 3 feet. After planting the area was harrowed three times and scarified three times. The type of Large Goldmine used was good, and showed care and knowledge in selecting the correct type. This variety suits Armidale conditions, and together with Wellingrove must be considered when a grower is selecting the variety suitable to his conditions.

The Gostwyck Estate, Uralla, entered a crop of Early Morn, which was planted on land about twelve years under cultivation, and followed a crop of oats. Ploughing took place in September, and planting in October, the rows being 4 feet apart with three grains checked in on the square. About ½ cwt. superphosphate to the acre was used. This was Uralla's first appearance in field maize competitions, and the members of the society are to be congratulated on their appreciation of the advantages accruing. They will prove somewhat formidable opponents to the remainder of the competitors for this championship.

Mr. G. A. Mepham, of Elsmore, Inverell, submitted a crop of Silvermine, which was grown on a sandy alluvial soil which had been under cultivation for five years, and which followed a crop of wheat for green feed. The paddock was ploughed in November and planting took place in December. The type of this variety showed some variation, and an irregularity in maturity, but for this season the preformance of this crop must be regarded as satisfactory.

The awards in this district were as follows:-

NEW ENGLAND Maize Championship.

Competitor and Variety.	Points awarded.									
	Cleanness of cultivation. (Max. 20 points.)	Germination or stand, (Max. 10 points.)	General appearance and condition, evenness, &c. (Max. 10 points.)	Freedom from insect pests and diseases. (Max. 10 points.)	Purity and trueness to type. (Max. 15 points.)	Estimated yield*	Total.			
J. Pedlow, Stonehenge, Glen	18	8	8	71	10	36	871			
Innes (Wellingrove) J. A. Duff, Cooredulla, Ten-		•					-			
terfield (Leaming) O'Dea Bros., Tilbuster, Armidale (Large Goldmine) Gostwyck Estate, Uralla (Early Morn) G. A. Mepham, Elsmore, Inverell (Silvermine)	18	9	9	71/2	10 <del>1</del>	33	87			
	171	8	8	8 <del>1</del>	111	33	86 <u>‡</u>			
	171	8 <del>1</del>	8 <u>1</u>	81/2	11 <del>1</del>	30	84 <del>1</del>			
	17	7	8 <del>1</del>	.9	10 <del>1</del>	24	76			

<sup>\*</sup> Three points for every 5 bushels of apparent yield.

#### Some Comment.

As a detailed list of varieties recommended for each maize-growing district of the State was published in the July issue of the Agricultural Gazette, reference to the suitability of varieties to districts has been avoided. However, the greatest importance must be placed on the use of suitable varieties for each locality, and growers will find little difficulty in working up seed supplies of them.

As in past competitions, traces of root-and stalk-rot diseases were seen, and though many growers are fully awake to the necessity for watchful care in this connection, and it is probable that by this means these diseases may be kept under a distinct measure of control, a few hints as to what may be done by the farmer in this regard may not be out of place. Seed selection should take place in the paddock, not only from the point of view of desirable seed collection, but also to prevent selection of seed from obviously diseased stalks. Particular care should be exercised not to select cobs for seed from stalks that are bent over or blown down, those which pull up very easily from the ground, or those stalks that have prematurely ripened cobs. When going over the seed so selected in the barn, those cobs which contain any split, mouldy or discoloured grains should be avoided, and those cobs that possess weight, with well filled and sound grain should be selected.

Early ploughing and adequate subsequent cultivation must still be regarded as of great importance, for inattention to these necessary preliminaries may never be overcome by later efforts.

#### A World's Grain Exhibition and Conference in 1932.

A world's grain exhibition and conterence of wheat-growers is to be held at Regina, Canada, from 25th July to 6th August, 1939. The undertaking has been planned on the most comprehensive lines and it should have a far-reaching influence upon agriculture, particularly on the quality and quantity of grain produced the world over.

The prize list is most attractive, obviously designed to attract a maximum number of exhibits of a representative nature. Over £11,600 is being offered in cash prizes for wheat, barley, maize, rye, buckwheat, rice, millet, field peas, soybeans, sunflower seed, field root seed, and collections of garden and vegetable seeds. In all there are 1,600 prizes, varying in value from £500 to £2. Particulars as to entrance fees, &c., can be obtained from the Canadian Trade Commissioner, Melbourne.

It is intended that the conference to be held in conjunction with the exhibition should be as representative as possible of the world's best thought in both the practical and scientific spheres. Experts from many countries are being solicited to take part, and in this way it is hoped to make the conference the "clearing house" for world thought and knowledge on every branch of field crop production and marketing.

## The Smooger.

A USEFUL IMPLEMENT ON SOME RIVERINA SOILS.

G. C. BARTLETT, H.D.A., Senior Agricultural Instructor, and E. B. FURBY, H.D.A., Agricultural Instructor.

In its raw state the Wimmera was rather heavy country of a mixed nature, consisting of both black and red soils with many puff banks containing a large percentage of lime interspersed with crabholes or gilgais of a very solid stiff clay. These soils were very difficult to break up and work down into a satisfactory tilth, and it usually took several years to bring them into a state of good order.

The implement that was universally adopted to bring this about was the "smooger," which is really a very heavy drag harrow with large spikes. Its effect was to break up the stiff clay clods of the gilgais, and at the same time to drag the top of the puff banks and scatter some of this soil over the crabholes. This gradually had a levelling effect, and at the same time the loose, crumbly puff banks became mixed up with the crabholes, thus loosening these up and making the surface more or less of a loose, crumbly nature that would not set. These soils have become easy to work

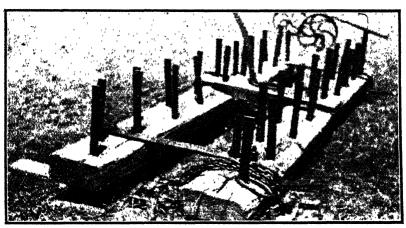


Fig. 1.-Home-constructed Smooger made from two old Railway Sleepers.

and require frequent shallow working with implements such as the scarifier (rigid time duckfoot) and harrows in order to consolidate the sub-surface soil.

#### Details of Construction.

The original home-made smooger is a rather crude implement, but at the same time is very simply and cheaply made, and is very effective. It consists of two old railway sleepers, held parallel, about 18 inches apart, by three flat iron bars bolted through the sleepers, while the spikes (usually pieces of similar flat iron bars placed edge forward and pointed at one end) are driven through the sleepers to any desired length. It is dragged broadside on by eight to ten horses. The accompanying illustration (Fig. 1) shows this type of implement.

Another effective home-made smooger can be made by making a 5-feet square of double 3-inch x 3-inch hardwood rails clamped together all round by 8-inch bolts, and with stout spikes set in on all four sides. It is best

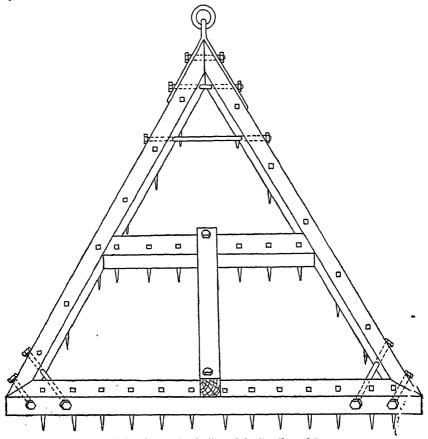


Fig. 2.—Sketch showing Construction of Another Type of Smooges.

made by first bolting the pieces of timber together, and then boring ¾ inch holes about 1 foot apart at the join. The clamping bolts are then backed off and spikes made of 1-inch square iron about 1 foot long are clamped into place in the holes. Two or three cross-pieces strengthen the implement and provide a frame upon which to rest added weight when necessary. This is drawn from a corner, and any corner can be used. One of the features of this smooger is its comparative lightness, which at times may be an advantage, while added weight can easily be applied if required.

Yet another type of home-made smooger (Fig. 2) is constructed of heavy beams about 8 inches x 8 inches placed in the form of a triangle, each side of which is 15 feet long. It is braced with a cross-beam of the same size, a little forward of the centre; this is let in flush with the side beams. A stay of the same heavy material is then bolted on top from the centre of the cross-beam to the centre of the back beam of the triangle. The draught is low down in front to prevent the point from digging in too deeply. The corners are usually mitred and held together with two heavy bolts across each corner. Checking and putting iron plates at the top and bottom of the corners is sometimes done. Occasionally one is made with an old single-furrow plough wheel with a round standard held in two journals inside the front point of the triangle, and a collar below the bottom journal used for adjustment; or a perpendicular rack can be put on the front and adjustments can then be made. These implements are usually roughly made, and the farmer depends upon the weight of the implement to "bite" into the banks, carrying about a yard or so of earth into the crabholes each time. The spikes must be heavy, as there is much weight and drag on them; if they protrude more than 6 inches they may be badly bent. They are usually placed 6 inches apart along the back and cross-beam, and a little farther apart along the sides.

There is on the market an improved type of smooger. It is really a heavy, triangular drag harrow, all iron, and may be mounted over wheels, with levers for altering the set, &c. It is made in three sizes, viz., 8, 10, and 12 feet wide. The times are  $\frac{\pi}{2}$ -inch square steel, 12 inches long. On heavy clay country it usually takes one horse per foot width to draw it.

The present prices are £16 10s., £18 10s., and £20 10s. without wheels and levers, and £31, £33 10s, and £37 10s with wheels and levers respectively.

#### Districts and Soils where it would be of Use.

There are many areas of considerable extent in the Riverina which are similar in nature to the Wimmera, and where the smooger might prove useful. These occur in the Narrandera, Jerilderie, Deniliquin, Moulamein, Finlay, Lockhart, Urana Daysdale, and even Coreen districts, and are considered to be excellent wheat soils under suitable cultivation methods. The methods used to work up the Wimmera soils could be applied for a few years to these areas—and these methods differ materially from the usual practices adopted for the bulk of our wheat areas on the red loams. The soil is best broken up by means of skeleton mouldboard ploughs, followed by the use of the smooger and frequent shallow workings with the scarifier and harrows.

Another type of soil upon which it would be advisable to use this implement occurs in many Riverina districts, viz., the straight-out heavy clay loams. These are difficult to catch in the right state for ploughing, as they usually do not remain in that state long enough to enable the required area to be ploughed. If ploughed a little on the wet side the furrow sets and, as one farmer has put it, one could nearly hitch a team on one end

and pull the whole length of sod out of the furrow. This sod is very difficult to break up. If ploughed on the dry side this soil is also not only heavy to work but also turns up lumpy. These soils usually dry out on the surface quickly in their rough state, and the hard clods present a difficult problem. They are frequently left till the autumn rains, and a disc then used. The disc is usually an undesirable implement to use after harvest, while, on the other hand, some excellent results have been obtained by using the smooger on these soils. It is best to get on to the land early in the spring before it dries out, which it sometimes does soon after ploughing, and cross the ploughing. The smooger breaks down the clods without pulverising the soil in the manner of the disc; it does not usually drag all the rubbish to the surface, and at the same time has a cultivating action.

#### Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of Such statement must reach the Department, Box 36A, G.P.O., Sydney, not later than the 12th of the month.

```
Wheat-
  Cleveland ...
                            ... W. Burns, "Goongirwarrie," Carcoar.
... E. H. K. King, "Karrindee," Uranquinty.
  Waratah ...
Maize-
  Fitzroy
                            ... Manager, Experiment Farm, Grafton.
  Large Goldmine
                            ... P. Short, "Moore Park," Armidale.
... Manager, Experiment Farm, Grafton.
  Leaming ...
                     ...
Broom Millet ...
                            ... Under Secretary, Department of Agriculture, Box 36A,
                                     G.P.O., Sydney.
Onions-
  Improved Hunter River
      Brown Spanish
                           ... S. Redgrove, "Sandhills," Branxton.
  Early Hunter River White S. Redgrove, "Sandhills," Branxton.
  Hunter
            River
                       Brown
      Spanish
                            ... C. J. Roweliffe, Old Dubbo Road, Dubbo.
Watermelon-
  Angelino
                            ... C. J. Roweliffe, Old Dubbo Road, Dubbo.
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A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

#### Mallee Farming.

[Continued from page 489.]

E. S. CLAYTON, H.D.A., Senior Experimentalist.

#### FACTORS INVOLVED IN WHEAT-GROWING IN DRY AREAS.

It is thought that if the position, so far as our knowledge extends at present with regard to the various limiting factors associated with wheat-growing, were discussed here in some detail it would afford a clearer understanding of the position. It will also throw some light on the special problems which have confronted and are still confronting mallee settlers and in fact all those associated with the production of wheat in dry areas in Australia, and should place the settler in a better position to give rein to his observation and the better equip him to plan his farming practices.

To all who are familiar with the finer points of wheat-growing, the fact is obvious that the intelligence, ingenuity and natural aptitude of the Australian wheat farmer, often in spite of quite limited technical knowledge, have frequently led him to the discovery of modified practices best calculated to overcome his peculiar difficulties. Nowadays almost all wheat-growers are working "hand in glove," as it were, with agricultural scientists, investigators and instructors, and in the search for practical solutions to existing problems the most advanced farmers are by no means behind.

#### The Effect of Light and Heat.

Light is a direct source of energy to the plant, and, of course, is essential to successful growth, but it is not a limiting factor in Australia, and so far as we know over abundant light of itself is not detrimental. It is, of course, associated with sunshine, and consequently the heat factor is introduced.

Plants can protect themselves against heat by evaporating water from their leaves, and in hot weather quite large amounts of moisture are in this way evaporated. Heat speeds up the vital processes, but temperatures which exceed those to which the plant is adapted are detrimental. A field crop grows faster on warm days and slower or not at all on cold days. Heat makes chemical processes possible to the plant, but of itself is not a direct source of energy. High temperatures, among other effects, tend to cause desiccation and, if the temperature goes too high, death. Low temperatures can delay, hinder or prevent germination, stop or retard growth and injure or kill the plant. The heat of the soil as well as of the air has its effect on the plant. The majority of crops grown in temperate regions grow satisfactorily when the average daily temperature ranges from 49 to 72 degrees Fahr. If this is accepted for wheat, it means that excessive heat of itself is not an extremely serious limiting factor in the wheat country in New South Wales during the growing period if it is not accompanied by low humidity and low rainfalls.

The accompanying table of temperatures, comparing Mt. Hope, as representative of the Roto mallee area, with other known and proved wheat districts, shows that in the last month of active growth (October) the average maximum temperature is only a little in excess of the 72 degrees Fahr. This means, considering the figures quoted for the average minimums, that the daily average for the month of October would be in all cases less than 72 degrees Fahr., and in all probability if growth ceased at all on account of this particular factor it would be only for a short period in any one day. These figures are reassuring in that they show that the average maximum October temperature at Mt. Hope is 3.1 degrees Fahr. less than that of Condobolin, while the November maximum temperature is also 3.2 degrees less than at the latter centre. Condobolin we know to be a district quite capable of growing profitable wheat crops. Lest the name Mt. Hope mislead the reader into thinking that this is an elevated station, let me add that it is in the centre of the mallee area under consideration and is only slightly higher than the surrounding mallee country, and is quite satisfactory for purposes of comparison. No confirming evidence is available as this is the only meteorological station in the area.

MEAN Maximum and Mean Minimum Monthly Temperatures at Mt Hope and other Representative Wheat Centres.

Station	Number of Years Recorded.	Jan.	Feb.	Mar.	Apl.	Мау.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Whole- Year.
Mt. Hope— Mean maximum Mean minimum Condobolin—	11 11	deg. 92·3 66·3	deg. 91.8 65.9	deg. 84·1 60·4	deg. 75.6 52.4	deg. 64.6 40.9	deg. 57.4 41.9	deg. 57°3 40°3	deg. 61°9 43°4	deg. 69°0 46°9	deg. 77°4 53°3	deg. 85*2 59*6	deg. 90°3 63°6	deg. 75.6 53.4
Mean maximum Mean minimum Parkes—	12 12	94·1 66·1	93-6 65-0	86·7 58·8	78·8 50·4	68·9 44·0	61·7 40·4	60.7 37.9	66·0 40•7	73·5 45·3	80·5 51·9	88·4 58 <b>·6</b>	92°5 63°3	78 8 51 9
Mean maximum Mean minimum Cowra—	11 11	91·2 65·1	50°4 64°6	83·7 59·7	75·4 52·5	65.8 46.8	58·8 43 1	56.8 40.2	60·9 42·5	68·4 46·3	76 1 51 4	83·5 57·0	88·7 62·5	75.0 52.6
Mean maximum Mean minimum Wagga—	8 8	92·6 63·0	90·7 61·4	83·9 55·8	75·9 46·6	64-9 42-2	57·6 37·4	56.0 36.8	36·8 0·09	66·3 41·1	75·5 46·6	84°8 52°9	80·1 58·8	74·7 48·2
Mean maximum Mean minimum Deniliquin—	10 10	91·6 62·1	91·2 62·5	88·7 56·7	74·9 47·1	64.6 42.0	57·3 39·2	56°6 88°4	60.8 39.4	67·1 43·5	74·6 47·2	82·0 53·5	88·2 58·2	74·4 49·2
Mean maximum Mean minimum	29 29	89·5 60·5	90 0 60.7	82·6 55·4	74·2 49·2	65·4 48·9	58·5 40·8	57·7 38·7	61·2 40·4	67·2 43·9	74·6 47·9	82·8 54·1	87·4 58·2	74·2 49·5

With regard to winter temperatures, Mt. Hope, as representing the Roto mallee area, has an advantage over Cowra and Wagga in that the mean minimum temperatures are not quite so low. Therefore, a little more growth will occur in the crops at Mt. Hope during the winter. The mean maximum temperatures for the spring and early summer months (August to November inclusive) at Mt. Hope are only slightly higher than Parkes, Cowra, Wagga, and Deniliquin. Condobolin, which is an established wheat-growing district, and which is situated only a comparatively short distance from Mt. Hope, actually has higher mean maximum temperatures for the months August to November. Therefore, we have some indication that the temperatures on this new mallee area are no less satisfactory than those of most

of our successful wheat districts, and in all probability no fear need be experienced on this score.

We are not handicapped to any great extent in Australia by extremely low winter temperatures. In fact we are distinctly favoured in most of our wheat country by comparatively mild temperatures during the winter months. The spring and early summer temperatures are also important factors. The temperature is often high at this time of the year, and when accompanied by high winds an additional strain is imposed on the crop. The rate of transpiration is increased, and additional moisture must be available or the crop suffers. Also the showers that are received are more quickly evaporated under these conditions and a smaller percentage of moisture soaks into the soil, so that less actual benefit is derived. When the conditions are severe the crop matures more quickly and the yield, of course, is reduced.

In districts favoured by a cool protracted spring the tendency is to produce heavy yields, even when the amount of rain received is not particularly generous; also greater use is made of the rain than when the same amount falls in districts with very high temperatures. In addition to a comparatively low and unreliable rainfall, some of our wheat country is in districts where the spring is unduly short in duration, i.e., there is too rapid a transition from winter conditions to those of summer. This tends to make the district earlier, therefore the growing period of the crop is somewhat reduced, and it comes into maturity more rapidly than in cooler districts and the yields are generally lighter. It is for these reasons that the temperatures should be considered when investigating the possibilities of new districts.

#### Moisture.

In order that plants may retain sufficient water to carry on the vital processes, the amount of water absorbed through the roots must approximately balance that lost by transpiration. Two sets of conditions, operating either singly or together, can upset this balance to the detriment of the plant. Either there may be so little moisture available that it is lost by transpiration more rapidly than the roots can supply it, or the loss of moisture by transpiration may be so rapid that the roots fail to maintain the supply, even though there may be sufficient moisture in the soil for ordinary requirements. A good example of the latter is found on the black soil plains of north-western New South Wales, especially when a hot, dry, westerly wind is operating. Instances have occurred there, where the soil was quite saturated with moisture in late winter and carrying a heavy and well-grown crop, a few periods of hot, dry, windy weather causing the crop to wilt off to such an extent that it failed for grain, although the soil was never dangerously dry, had it been of an ordinary nature. The chief cause is the exceptional nature of this peculiar, black, crumbly soil, which is so retentive of moisture that as soon as the extra strain is imposed it refuses. to yield up its moisture to the crop rapidly enough to prevent injury, although there may still be an appreciable amount of moisture in the soil.

When the two causes of disturbance mentioned operate together, as they frequently do in Australia, they have a very severe effect. Often the rate of transpiration is very high (due to low humidity, strong winds and high temperatures) and at the same time the soil has only a very limited amount of moisture.

The amount of moisture a soil will hold and the rapidity with which it can absorb rain and yield up moisture to the plant are governed by its The actual precipitation is not so important as the physical properties. amount of moisture that remains in the soil for the use of the plant. This depends chiefly on the nature of the soil (which governs the run-off to a great extent), the season of the year, evaporation, &c., and the nature of the fall. This all goes to show why it is so necessary for the soil to be of a light texture to grow wheat successfully in dry climates. Where the rainfall is low the soil must be of such a nature that it will readily absorb any moisture that falls. It must also be able to yield up that moisture to the plants when required at a sufficiently rapid rate to maintain the plant's equilibrium. Also, it must have a sufficiently retentive subsoil to prevent the moisture penetrating so far into the depths as to be beyond reach; it must also be of such a nature that it will not lose too much moisture to the air by evaporation, and, in addition, if possible, it should not readily drift or blow.

Another factor worth consideration is the manner in which the rain falls. In the western and north-western portions of New South Wales, even although the winter rainfall may be sufficient in most years, the advent of winter does not usher in a definite rainy season. Some of the Victorian and South Australian districts are better favoured in this respect, as they have a greater number of wet or overcast days, especially in the spring, and consequently as showers are not so likely to be followed immediately by strong sunshine and rather hot dry winds, more benefit is actually derived from the rain that falls.

In considering the effect of rainfall on wheat yields it is important to consider the distribution of the rainfall together with the plant's requirements at different times. Very little is known at present regarding the latter, but some information is available on the subject. Australian investigators have shown that winter-sown wheat adds to its dried weight at an increasing rate for the first four months, while the maximum rate is reached when coming into ear in early October, from which period onwards the rate of increase decreases until harvest. This throws some light on the subject. It is necessary that the plant foods in the soil should be in an available form to meet this increasing rate of growth, and therefore the presence of moisture can be taken as being particularly necessary a little before this period of maximum increase. This indicates to some extent why the August-September rainfall is such a dominant factor. It would seem that the greater the amount of rain received in August and September the heavier the ultimate yield, provided, of course, that the rain is not sufficiently heavy or continuous to cause damage in other directions, such as by favouring rust, water-logging the soil, &c.

#### How Wheat Plants React to the Weather.

So important is the effect of the weather on plant growth, especially at critical periods of the plant's development, that full discussion of the factor is worth while.

The weather conditions which favour vegetative growth do not necessarily favour reproductive growth, and the rankest growing wheat crop does not always yield the most grain. We know that, under average conditions in Australia, crops sown early tend to grow tall and make good hay crops, while those sown later in the sowing season tend to produce more grain in relation to the weight of straw. These tendencies can, to a great extent, be attributed to the effects of the weather. It is intended here to devote special attention to discussing the effect of the weather on the wheat plant at different stages of its growth.

The first critical stage is that of germination and formation of the first leaf. In order that the seed may germinate it is necessary that the soil temperature be sufficiently high and adequate moisture be present. Investigations have shown that wheat can germinate at as low a temperature as 41 degrees Fahr., and at up to as high a temperature as 96.8 to 100.4 degrees Fahr., with the optimum at 68 to 77 degrees Fahr. The question of soil temperature at seeding time has not been investigated to any extent in Australia, but in other countries it is considered of importance. In India, for example, it is said to be safe to sow when the soil temperature has fallen to about 77 degrees Fahr. If wheat is sown too early in the autumn, while the temperature is still too high, the plants may start well, but will soon decay. If, on the other hand, in cold regions the seed is sown so late that the soil temperature is very low, the germination is slow and the plants do not get well established before winter sets in. Thus it is that a very late summer in the warmer regions or a very early winter in the colder regions of wheatgrowing countries often considerably reduces the yield of winter wheat. It is thought that, because of our usually mild autumn and winter temperatures, we in Australia are not affected by this factor to any extent. That may be so, but considerable differences in yield have often been observed when all conditions, including moisture content, have been similar, with the exception of the date of sowing, so perhaps the temperature of the soil has had some effect. In any case this factor is worth investigating, as in an effort to obtain greater production we can afford to leave no important possibility unexplored. We know the extreme importance of getting a crop germinated and away to a good start and great judgment must be exercised in seeding, but once the recognised time of the year has arrived, farmers at present are only concerned with the amount of moisture present in the soil, its physical condition and the presence or absence of weeds. The temperature has been taken for granted. It seems likely, however, that, other things being equal, crops sown when the temperature is most suitable will germinate and grow better than those sown when the soil temperature is not so favourable. As the germination and early growth are most important factors in determining ultimate yield, it seems probable that the yield would be influenced by the soil temperature at sowing time.

It is generally accepted that wheat needs only sufficient moisture during the first six weeks of its growth to keep it growing vigorously. Too much moisture at this time is often detrimental. So also, of course, is too little. The period between sowing and appearance aboveground varies with the variety and the soil conditions, especially temperature and moisture, but averages about eight or nine days. Some authorities consider it is during this period that the length of head is determined. The importance of the period is unquestioned and the more information we can gather on this subject the better position we will be in to bring about an increase in yield. The manner of germinating is of paramount importance, especially in the case of spring wheat, since it determines the size of the leaf, which in turn eventually determines the size of the plant itself, and it is of only slightly less importance in the case of winter wheat.

The second stage to be considered is from the formation of the first leaf until heading. This is the longest stage in the life of the wheat plant, and it is apparently much less sensitive to weather conditions than during germination. In the very young stages immediately following the aboveground appearance of the plant it is very susceptible to adverse influences. A good root system must be developed early and the tillering should be satisfactory. Insufficient moisture and very low temperatures are unfavourable. To induce strong rooting only a moderate amount of moisture seems to be necessary, but more is needed to cause vigorous tillering. Where the winters are mild, as in most of the wheat-growing country of Australia, a considerable amount of growth takes place during this period, especially on warm days, and mild warm weather seems favourable. In fact, it seems likely that were it not for the fact of the mild winter temperatures obtaining in most of the driest districts in Australia, successful wheat-growing would not be possible, as once the winter is over there is a rather rapid transition to hot dry summer conditions, which considerably shortens the growing period.

It has been stated that 40 deg. Fahr is the minimum temperature for the growth of wheat, and it is assumed that there is a cessation of the growth in the winter, when the average daytime temperature is less than 39.2 deg. Fahr. It is generally accepted that the wheat plant shows comparatively little response to variations in the weather conditions during the period under consideration, provided these variations are not too severe. Some investigators, however, consider the period just immediately prior to heading as one during which the plant is susceptible.

During the period of heading and flowering the plant is very susceptible to weather conditions. Cool weather and abundant moisture at this time favour heavy yields, except in climates that are naturally over-moist. There is a difference of opinion as to the exact stage at which these conditions should obtain. Some think they should prevail when the plants are beginning to head; others, just prior to flowering, and others between the flowering and the milk stage. It seems that the period immediately prior to heading is important, and rain at this time is beneficial, also during heading and flowering, provided it is insufficient to interfere with

High winds which increase transpiration are particularly objectionable at this period. High temperature and lack of moisture at time of flowering tend to cause the formation of sterile heads. Lack of rain at flowering may not be so unfavourable if there has been sufficient in the preceding ten days to carry over. It has not yet been definitely settled whether the most critical period is before, during, or after flowering. However, the general period has been decided. Any condition tending to reduce transpiration, such as cool, cloudy, moist weather, reduces the demand upon the roots for moisture and has a tendency to increase the yield. If, on the other hand, there is anything tending to increase transpiration, such as hot, dry winds, the demand on the roots is increased. If transpiration becomes too great the roots cannot supply the moisture at a sufficiently rapid rate to prevent injury to the plant. Although there may be sufficient maisture available to enable the roots to maintain the supply to the plant of the stage prior to flowering, the water balance of the plant is upset apparently by the act of flowering, and an added strain is placed upon the roots. If their task is rendered more difficult by dry, hot conditions, injury can easily result. This shows how critical a stage it is. From this natural injury or desiccation which the plant normally suffers by the act of flowering, even under favourable conditions, it never completely recovers, as the ratio of solids to water in the plant continues to increase until the death of the plant. It is accepted that the time of decease is largely governed by the degree of injury which the plant suffered at flowering and upon the environmental conditions following flowering. If conditions favour a high transpiration rate the desiccation of the plant will be rapid. Very hot, dry, windy conditions shorten the survival period, and unfortunately these frequently obtain in the mallee of Australia, and in fact in all our wheat country on the outer fringe of the wheat belt. Under these conditions high yields cannot be expected, and it is only when the spiring is cool and comparatively moist that such are possible.

If, on the other hand, the restoration of the water balance is favoured by cool, showery, humid weather, the tendency is to lengthen the survival beriod and so increase the yield. This is what is frequently happening in the favoured country on the eastern side of the wheat belt in New South Wales, where quite heavy yields are often obtained. Such weather during the earlier stages of ripening is favourable, but it is apparently less important than during flowering. Too much rain towards the end of the ripening period may even be detrimental.

It is believed that in the early stages of the formation of the wheat grain the protein is laid down in greater ratio than the starch. In the later stages relatively more starch is deposited, therefore the total amount of starch in the grain is to a great extent determined by the length of the survival period. Grain that is grown in the dry country, as on the outer fringe of the wheat belt, when it is hastened into maturity is likely to contain a relatively high percentage of protein and a relatively low percentage of starch, but the grain will be more shrunken and the yields less than where the survival period has been longer and more starch has been deposited in the grain.

Another weather factor likely to affect the crop is, of course, frost, and if it occurs at the flowering stage the crop is particularly liable to injury. Frost, if sufficiently severe, can injure wheat at any stage of its development, from germination until the grain is almost ripe, but most damage can be done at the critical periods. Weather factors have to be much more severe to cause injury at non-critical periods, than at critical stages of the plant's growth. (To be continued.)

TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculor is by Government Veterinary Officers, or approved veterinary surgeons, in ac cordance with the Veterinary Officers, or approved veterinary surgeons, in at the following requirements of the scheme of certifying tubercle-free here declared, this have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of the each herd:—

Owner and Address.			Number tested.	O. ortification.
			1	1 11y, 1980
E. P. Perry, Nundorah, Parkville (Guernseys)	•••		28	1000 1000
Secred Heart Convent. Bowral	•••		11	I A( +) I TOOA
J. F. Chaffey, Glen Innes (Ayrshires)	•••		56	29 "VE. 1080
A. Shaw, Barrington (Milking Shorthorns)	•••		120	
St. Patrick's College, Goulburn			9	7 10 1930
Walter Burke, Bellefaire Stud Farm, Appln (Jerseys)			52	17
	•••		85	00 4 1000
Mittagong Farm Homes, Mittagong	***		70	1 000
H. W. Burton Bradley, Sherwood Farm, Moorland (Je	rechel			1930
James McCormick, Tumut	•••			1000
Walarol College, Orange	•••			1131490
Riverstone Meat Co., Riverstone Meat Works, Riverst	оде	•••	115	11030
J. L. W. Barton, Wallerawang	•••		18	25 Oct., 21 930
Blessed Chanel's Seminary, Mittagong	•••	***	5	
H. A. Corderoy, Wyuna Park, Comboyne (Guernseys)	•••	,	54	1 Nov., 11-030
Glen Innes Experiment Farm (Ayrshires)	•••		62	9 49 19 3836
	•••		85	1 8 190 m
T Damies David David Come (Tennes)	•••		40	11 , 19
				22 198
I manage Department Callen Bank Mantal Hamital	•••		90	100年 湯
Lunacy Department, Callan Park Mental Hospital	***			1 Dec. 1980
Bathurst Experiment Farm (Jerseys)	•••	*** 1	30	
Lunacy Department, Morisset Mental Hospital	***	***	. 21	7 Jan., 1931
Parbery, C. J., Allawah, Bega	•••	***	88	7 , 1981 %
Wagga Experiment Farm (Jerseys)	•••	•••	78	10 1981
Kinross Bros., Minnamurra, Inverell (Guernseys)	•••		72	11 ,, 1981
New England Girls Grammar School, Armidale	***		19	16 , 1981
Lunacy Department, Parramatta Mental Hospital	***		89	400
Kisa Brennan, Arrankamp, Bowral	•••		10	19 Feb., 1981
Department of Education, Yanco Agricultural High Sci	hool		- 00	
operation of reductions removes the contraction of	moor			
G. A. Parrish, Jerseyland, Berry	***		108	
Lunacy Department, Kenmore Mental Hospital	•••	***	76	28 , 1981
Hawkesbury Agricultural College (Jerseys)	***	***	180	1 Mar., 1981
St. Joseph's Girls' Orphanage, Kenmore	***		10	3 ,, 1931
St. Michael's Novitiate, Goulburn	***	***	5	8 ,, 1981
Kyong School, Moss Vale	***		8	4 . 1981
St. Joseph's Convent, Reynold-street, Goulburn			4	4 1981
St. John's Boys Orphanage, Goulburn	•••		7	5 , 1981
Marion Hill Convent of Mercy, Goulburn			10	4001
Cowra Experiment Farm				0 1001
Distriction Waldows Warms Warms	***		200	0 1001
William Towns Townsells Translitus	***	•••		
where the series of the series	***	***	51	12 ,, 1981
Tudor House School, Moss Vale	***	***	8	21 ,, 1981
H. F. White, Bald Blair, Guyra (Aberdeen Angus)	***	***	202	8 April, 1981
Grafton Experiment Farm (Ayrshires)	***	***	180	5 , 1981
Department of Education, Huristone Agricultural Hig	h Scho		' 45	10 , 1981
Navus Ltd., Grose Wold, via Richmond (Jerseys)	***		18	29 1981
Australian Missionary College, Cooranbong	***		45	80 , 1981
McQuillan, J. P., Bethungra Hotel, Bethungra				1 May 1981
George Rose, Avimenton	•••		1 1	00 " 1661
William Thompson, Masonie School, Baulkham Hills	***	***		28 ,, 1981
Department of Parastian Content Towns	***	***	47	28 ., 1981
Department of Education, Gosford Farm Homes	***		80	8 June, 1981
F. C. Kershaw, Macquarie House, Macquarie Fields	***		71	28 1981 8 June, 1981 5 1981
P. Ubrihlen, Corridgeree, Begs		***	114	6 , 1981

MAX HENRY, Chief Veterinary Surgeon.

#### Fallowing Competitions, 1929-30.

FURTHER REPORTS FROM JUDGES.

#### Central-western District.

W. D. KERLE, H.D.A., Senior Agricultural Instructor.

The only fallowing competition held this season in the Central-western District was conducted by the Cowra P.A. and H. Association. The unprecedented dry conditions which prevailed all through the fallow period were mainly responsible for the Agricultural Associations at Eugowra, Grenfell and Canowindra not continuing the competitions held in previous years.

#### The Season.

The normal fallow period in this district commences in July or August, being largely dependent on the winter rainfall. It most frequently happens that the ground is too wet to turn over nicely in the winter months, and very often it is August before the initial ploughing can be done properly. This was not the case this season, however, the winter months being the driest on record and averaging considerably less than an inch per month. Fallow that was ploughed in June and July and portion of August turned over well, but where ploughing was delayed until spring it was impossible to do it satisfactorily.

The first rain of any value to the fallows fell in November and was followed by good falls in December. Although the summer of 1928-29 was dry and drought conditions prevailed right up to November, 1929, the early part of 1930 was even worse, the three months January to March giving less than 1 inch in most places, and in small falls of no value.

It will be seen, therefore, that the fallows judged in March depended for their moisture on the November and December rainfalls, totalling 6 to 7 inches, and as these fell on a soil and subsoil which were bone dry, it is not to be wondered at that the moisture content of the fallows was not high. The absence of January rains in particular prevented the growth of weeds on the fallow, and, although Stink grass made a start with the December rains, it did not make much headway.

Naturally the fallows lacked consolidation owing to their dry condition. There is nothing better for consolidating fallows than heavy rain, and attempting to produce consolidation in a dry soil by artificial means is waste of time—in fact, working a dry soil in the summer will do more harm than good unless, of course, it is to destroy such weeds as couch or sorrel.

The rainfall at Cowra for the fallow period 1929-30 was as follows:—June, 105 points; July, 14; August, 85; September, 83; October, 111; November, 389; December, 310; January, 38; February, 23; and March. 20 points. Total, 11.78 inches.

AWARDS in (	Cowra.	Fallow	Competition.
-------------	--------	--------	--------------

Competitor.	Moisture (Max. 35).	Mulch (Max. 35).	Cleanli- ness (Max. 35).	Compact- ness (Max. 35).	Headlands and finishes (Max. 10).	Total (Max. 150).
W. A. O'Neil and R. Kent (No. 1) S. W. Brien F. S. Walker W. A. O'Neil and R. Kent (No. 2 M. H. Collins E. S. Twigg	30 28 27 30	31 33 30 30 30 20	35 35 35 35 35 35	33 29 27 27 23 20	10 10 10 10 9 9	139 137 130 129 127 84

#### Details of the Leading Fallows.

Messrs. W. A. O'Neil and R. Kent (No. 1).—The soil is a light greyish-coloured loam with a clay subsoil. It had been mouldboard ploughed 4½ inches deep in mid-August, rigid-tined in late October, again in mid-November, and harrowed the first week in January. The rainfall on the fallow was 10.59 inches, 7 inches of which fell in November and December. The fallow contained excellent moisture for the season, was free of all weed growth, and was exceptionally well and evenly compacted. The mulch was of very even depth and slightly caked. The finishes were well covered and the headlands reduced to a minimum. It would have been considered an excellent fallow for a good season, and was therefore a remarkably good one for this, the driest season ever recorded, and reflects great credit on this competitor.

Mr. S. W. Brien.—The soil is a medium red loam and had been mould-board ploughed at end of August, harrowed November, combined end of December, again end of January, and harrowed in March. The actual rainfall from ploughing to judging time was 8.57 inches. The November-December rainfall was 2 inches less than on Messrs. O'Neil and Kent's property, but a heavy storm which the latter missed was experienced in January and registered 1 inch.

The moisture content of the fallow was excellent, considering the year, although it varied considerably, due mainly to inequalities in the soil. The surface was excellent, but the mulch was too deep and the subsurface correspondingly too shallow, due to working too deeply in January. Mr. Brien was, however, forced to cultivate deeply to fill in washouts occasioned by the heavy rainstorm mentioned above. Weed growth was entirely absent, and the fallow generally was of excellent appearance.

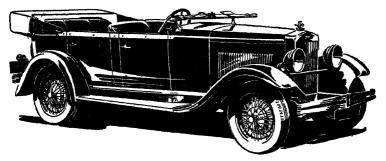
Mr. F. S. Walker.—Soil is a light to medium loam on which a crop of oats for grazing was grown previously, the land being disc ploughed 4 or 5 inches deep in October, harrowed November, springtoothed deeply September, cross harrowed early January, and combined early February after a heavy rainstorm of 130 points. The moisture content was very good, but far from uniform, due to uneven consolidation and mulch. The defects of this fallow could be traced chiefly to a caked soil, due to too heavy grazing in the winter, and delayed ploughing. The dry spring did not permit of the breaking

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## DODGE BROTHERS SIXES AND EIGHTS

down properly of the clods, and the unevenness in the subsurface soil and lack of moisture were due to buried clods and to the use of the springtooth instead of a rigid tine type of cultivator. Weed growth was conspicuous by its absence on this fallow also.

#### Comments.

The chief feature of this competition was the excellent moisture content of the leading fallows, which demonstrates that by early ploughing and correct and subsequent workings moisture can be stored within 2 inches of the surface in the driest of seasons. The chief factors in securing this moisture are ploughing early and when the soil is in the right condition, a deep cultivation early in spring, preferably with a springtooth cultivator, and further cultivations with harrows or rigid time cultivator after rain to restore the mulch and destroy weeds. The latter implements are particularly useful for producing an even depth of mulch and a level top to the subsurface soil.

The judicious employment of sheep on the fallow greatly assists in keeping it in the right condition. The ruination of a fallow, on the other hand, most frequently follows the practice of allowing weed growth to become bad in order to provide feed for sheep. While this would have been justified somewhat this season, had favourable rains fallen, owing to the almost total absence of natural pasture and the starving condition of the sheep, as a general practice it is to be condemned.

An important advantage of a correctly worked fallow is its condition at seeding time, for although March and April rainfalls may have been light as in this season, there is no danger in sowing, as a moist compacted area, 1½ to 2 inches from the surface of the soil, in which the seed can be deposited, ensures germination. Correct fallow preparation particularly eliminates sowing the seed, as is very frequently done, in a dry seed-bed, resulting in weed-infested and, most probably, diseased crops.

#### South-western District.

#### D. V. DUNLOP, H.D.A., Agricultural Instructor.

During the year 1930, fallowing competitions were conducted in the south-western district by the Ardlethan, Ariah Park, Barellan, Barmedman, Bribbaree, Murrumburrah, Young, Quandialla, Temora, and Ungarie Agricultural Associations and Tullibigeal Agricultural Bureau—a total of eleven competitions and almost 200 entries. These figures show a substantial increase on any previous year, and when the dry conditions existing during the fallowing period are considered the interest that exists in these competitions throughout the south-west will be realised.

#### The Season.

Seasonal conditions during the fallowing period were such as to render the production of a high-class fallow extremely difficult. June and July were unusually dry, no good rain being recorded until August—in many

cases ploughing was delayed until this month. Fair rains were experienced during the spring, but the late summer and autumn were very dry, the result being that comparatively few cultivations could be given after harvest and sheep were used extensively to keep the fallows clean.

RAIN	FALL	during	the	Fallowin	g P	eriod.

	Temora.	Ariah Park.	Barellan.	Brib- baree.	Quan- dialla.	Young.	Bar- modman.	Tulli- bigeal.
August September October November January February March April Totals to tim judging.	 points. 139 262 71 252 153 113 73 1,063	points. 120 216 35 196 170 6 14 5 7	points. 163 153 53 109 105 16 43 5 647	points. 142 131 74 263 225 40 67 27	points. 144 175 35 179 208 63 134 25 12	points. 168 87 83 133 243 262 30	points. 115 239 32 196 135 51 8 776	points. 117 140 73 133 197 10 51

#### Particulars of the Winning Fallows.

Barellan Competition.—The Barellan competition was particularly interesting in that the fallows were divided into three classes, viz., light soils, heavy soils, and mallee soils. The latter class was an undoubted success, but it is sometimes difficult to classify fallows which contain both light and heavy soil. However, the principle is sound and other societies in districts where marked differences in soils occur would be wise to follow the example of Barellan.

Light Soil Section.—This section was won by Mr. T. Jamieson, who was awarded 133 points. The land had been sundercut ploughed 3½ inches deep in June, springtoothed full depth in August, and springtooth cultivated again in January. The soil was in excellent condition, very mellow, and in ideal order for sowing.

Heavy Soil.—Mr. R. J. Elwin won with 129 points. The paddock was mouldboard ploughed 4 inches deep in June, scarified in July, harrowed in October, and scarified at end of March. This particular fallow scored the highest points in the competition for compactness, the early cultivations being largely responsible.

Mallee Soils.—Mr. C. Joiner's winning entry was awarded 134 points. It was mouldboard ploughed 3 to 3½ inches in August, springtoothed in October and February. This fallow had a high moisture content compared with the heavier soils and the seed bed was good.

Ardlethan.—Won by Mr. D. Knight with 135 points. The land was disc ploughed 3½ inches in August, harrowed in September, springtoothed in November, and harrowed in March. Mulch a little fine and shallow, but seed bed good.

Ariah Park.—Mr. J. Hawkins was awarded 126 points for his winning fallow. The land was medium red loam, mouldbeard pleughed in June, springtoothed in October, harrowed in November, scarified in February and March. Moisture good for season, mulch somewhat uneven.

Barmedman.—Messrs. McGuire and Fehon won this competition with 131 points. The entry was medium loam, scarified in February, mould-board ploughed 3 inches in July, springtoothed to full depth in September, springtoothed in December.

Bribbaree.—Mr. F. Bauer obtained first place with an entry which had been long summer fallowed. It was disc ploughed 3½ inches in March, harrowed in September, scarified in October, November and December. It was also harrowed in October, November, and December. The cultivations were excessive, resulting in an over-fine mulch.

Murrumburrah.—Mr. W. J. Coddington was awarded 141 points for his No. 1 entry. It consisted of medium red loam soil, ploughed in July, springtoothed in November, January, and March, followed by a harrowing in March. Its greatest defect was a slight unevenness of the seed bed.

Young.—First place was awarded to Mr. G. H. Coddington with 140 points. The land was a light red loam, ploughed in August, harrowed in September, springtoothed in November, December and February.

Quandialla.—Mr. J. Graham was awarded 136 points for his winning entry. The land was heavy clay loam, patches self mulching. It was mouldboard ploughed 4½ inches in August, springtoothed in October, cross springtoothed in December, and harrowed in February.

Temora.—Mr. H. Murphy won with 141 points, the land being medium red loam, which was mouldboard ploughed 4 inches deep in July, springtoothed in September, and harrowed, springtoothed, and harrowed in November and again in December, with another harrowing in March.

Ungarie.—First place was awarded to Messrs. Johns Bros. and J. Clay, with 128 points. The land was ploughed June-July and cultivated after the rains of August and September, and again after harvest. This was Ungarie's first competition and was a marked success, attracting twenty-six entries.

Tullibigeal.—The winning fallow was exhibited by Mr. J. Boyes on land of self-mulching type. It was scarified during June and July, and again August-September, combined in October, scarified January, and combined March.

#### Comments.

In spite of the adverse season there was a marked improvement in the quality of the fallows submitted in most of the competitions. The importance of a carefully worked fallow is being realised more each year in the south-west, and the areas so treated are steadily increasing.

The greatest defects noted this year were irregularity of depth of mulch, poor compaction of seed bed, presence of wheat stubble, and lack of moisture. It must be admitted, however, that the defects, to a certain extent, were due to the low rainfall, which made it difficult to give sufficient

cultivations to bring about the required compactness, &c. In each competition, however, the leading entries were an object lesson as to what can be done under difficulties.

The importance of early ploughing was again demonstrated. things being equal, early-worked fallows showed a greater moisture content and better compaction. In some cases springtoothing to full ploughing depth soon after ploughing was neglected, resulting in poor and irregular compaction. This cultivation is probably the only one which should be given irrespective of rain, as it really forms the seed bed which is compacted by later rains, &c., and should not be disturbed by subsequent cultivations, which should be shallow.

Sheep played an important part in keeping down what little weed growth occurred, often obviating the necessity for a "dry" cultivation while their tramping also aided compaction.

Moisture content was generally fair to good for the season, in most cases it was present below ploughing depth, and comparatively little rain was required later to supplement it and so insure a good germination.

The use of harrows is becoming more general for later cultivations. They provide a cheap and quick method of reforming a mulch after rain. Their use is to be recommended on the heavy self-mulching types of soil, but care must be taken on soils that are inclined to "set," as the harrows have a tendency to make them too fine. In light, mallee soils it is doubtful if they should ever be used, as time implements fitted with broad points leave the land slightly ridged and prevent it becoming too fine.

#### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 364. G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

1930. Peak Hill (W. R. L. Crush)
Gilgandra (G. Christie)
Tullamore (S. D. Cameron)
Lake Cargelligo (C. V. Hastings)
Trundle (W. P. Forrest)
Illabo (J. McCarthy)
Grenfell Aug. 5, 6. ,, 12, 18. ,, 13. 9, 10. 10. 10. 10. Cowra Sept. Barmedman Barmedman Bogan Gate (J. a'Becketi) Deniliquin (P. Fagan) ... ... 19, 20, 19, 20. \*\*\* \*\* ,, 19, 20, 20, 27, 28, 26, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 27, 28, 2, 3, 2, 3, 4, 5, 4, 5, Canowindra \*\* \*\* Forbes (E. A. Austen) ... Temora (J. M. McInnes) ,, \*\* Condobolin (J. M. Cooney) Wagga (F. H. Croaker) Gunnedab ,, \*\* Barellan ... ,, Ardiethan
Quandialla
Walbundrie (H. G. Collins)
Leeton (W. Rosswarn)
Hay (George C. McCracken)
Narrandera (J. D. Newth) ... Oct. wagga (F. H. Groaker)
Gunnedah
Ungarie (D. R. Bedford)
Galston (W. J. Fagan)
Junee (G. W. Scrivener)
West Wyalong (A. Andrews)
Murrumburtah
Murrumburtah ... ,, ... ... ... \*\* ... \*\*\* Sept. ... \*\* ... \*\*\* ... ,, ... Bribbaree Corowa (H. Norton)

Parkes (L. S. Seaborn)

Singleton (J. T. McMahon)

Boorowa (S. G. Hughston) 31 ++ Ariah Park ,, ... \*\* Griffith \* Griffith Cootamundra (G. B. Black) Milithorpe (T. P. Smith) ,, 1981. Liverpool ... Castle Hill Newcastle (P. Legoe) Granville ... 6, 7. 18, 14. 17 to 21. Feb, ... March 6, 7. ... , 20, 21. ... , 27, 28. ... April 23, 24, 25. Nepean St. Ives ••• \* Brookvale... Richmond (R. B. Tate) \*\*\* ••• \*\*\* \*\*\* \*\*\*

\*\*\* \*\*\*

Blacktown

#### Cucumber Varieties.

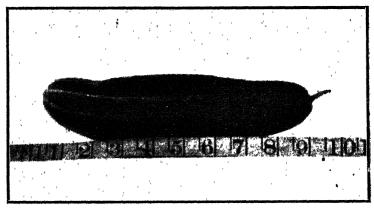
N. S. SHIRLOW, B.Sc.Agr., Assistant Plant Breeder, Hawkesbury Agricultural College.

THE cucumber, although not recognised as a main crop in any part of the State, is looked upon as a very important sideline in districts where an early crop can be obtained.

Observations on local and introduced varieties have been made at Hawkesbury Agricultural College with a view to ascertaining their usefulness either directly or for breeding purposes, and they have been classified into three groups.

English Type.

This group is characterised by cylindrical fruit practically free from spines, and often more than 2 feet in length. Plants of this group grow well with a minimum of light and set parthenocarpic fruits freely. They are not suitable for growing for the local market on account of their late maturity, and further the fruit is rather long for packing and has thick flesh and little seed space.



Davis' Perfect.

The type has been used considerably in crosses in the United States with the American field type to produce varieties of intermediate type for greenhouse culture, which combine the free-setting habit of the English type, with the more marketable size, shape and colour of the American. Locally listed varieties of the type are Mangere Prize and Telegraph.

#### Intermediate Type.

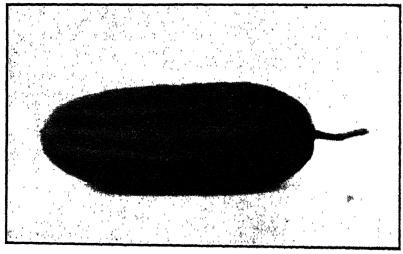
Davis' Perfect, Deltus, and Hescrow are introduced varieties of this type, which should prove useful for the glasshouse culture of cucumbers, which is just beginning in New South Wales. These varieties set fruit parthenocarpically (i.e., without fertilisation), and thus overcome the problem of

fertilisation in glasshouse culture. They partially retain the smoothness of the English type, but are not as long, and conform to the shape of the slicing cucumber.

#### American Field Type (Slicing Cucumbers).

This group comprises most of the local market varieties. It is characterised by rather short, thick fruit, roughly triangular in cross section. The fruit when young is covered with white or black spines. This group is subdivided into:—

(a) White Spine Varieties.—The skin of varieties in this subdivision is covered with white spines and turns whitish when the fruit is ripe. Commercial, White Spine, and Early Fortune are locally-listed varieties, which appear to be the best croppers, being early maturing and producing fruit of a good uniform size. Other varieties in this group which are listed by



Commercial-a White Spine Variety.

local seedsmen are Fordbook Famous, Early Evergreen, and Standard Bearer. Kirby Stay Green is a recent promising introduction from America, which is of medium and uniform size and keeps its colour well.

(b) Black Spine Varieties.—The skin of varieties in this subdivision is covered with black spines when young and turns brown when ripe. There varieties are generally not as good as the White Spine varieties, and tend to lose their green colour earlier. Locally-listed varieties are Long Green Prickly, Improved Long Green, Jap Climbing, Giant Pera, and Market King.

#### Pickling Type.

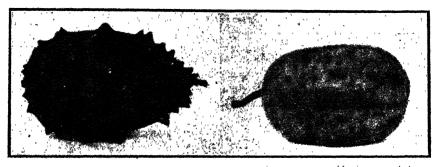
The varieties in this group are characterised by a large number of spines, small size of fruits and prolific fruiting habit. In the United States the commercial pickle manufacturers prefer black spine types, and the pickling

type is not important here as local manufacturers use the best white spine types such as Commercial and Early Fortune.

Locally-listed varieties which may be classified in this group are the short green types such as Boston Pickling, Improved Short Green, Livingstone's Evergreen, Thorburn's Everbearing and Siberian.

#### Apple Type.

Apple and Crystal Apple are the two locally-catalogued varieties of this type. They are later-maturing than the American field types. The skin is of a creamy or straw colour (the former variety being straw and the latter cream coloured). The skin of Apple is covered with very fine black spines, and the fruit is practically round. Crystal Apple has fine white



African.

Crystal Apple

spines and is more elongated in shape. These varieties both bear hermaphrodite flowers, are very heavy croppers of excellent eating quality, but their colour is somewhat against them as yet on the local market. The Lemon cucumber of the United States is identical with Apple.

#### African Type.

The African or African Horned variety belongs to this group. It is very late-maturing and the fruit is small, dark green in colour, turning to deep orange later, oval in shape with spines produced on projections up to ½-inch long, which gives it a very prickly appearance. The flavour and quality are good, but it is not suitable for commercial use on account of its prickly nature and extreme lateness in maturity.

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### Yanco Irrigation Area Rice-growing Competition, 1929-30.

H. J. DARGIN, Agricultural Instructor.

RICE-GROWING competitions under the auspices of the Yanco Irrigation Area. Agricultural Society for a cup donated by the Rice Millers' Association, have now been in vogue for the past five years, and the difference between the crops submitted for adjudication now and five years ago is most marked. The rice growers on the area are fully alive to the benefits derived from these competitions, with the result that twenty-eight entries were received by the society this year, of which twenty-six were judged, two having been withdrawn. Of the crops judged twelve were grown on virgin land, eleven on land that had previously grown other cereals, and the remaining three were on second-year rice land; practically all of the types of soil on this end of the area recommended for cultivation of rice, were included in the entries.

#### The Season.

During the early part of the season (late September, October, and early November) weather conditions were cold and unseasonable, with the result that the seed sown on the red loams, red clay loams and soils of light texture germinated more readily, and the young plants made a quicker and more even growth than was the case on the dark soils, blue clay loams. grey clay loams, and soils of heavy texture, which always remain cold for a longer period than the former group. Hence the reason this year of a great number of rice fields on red soils and those of light texture, sown and watered considerably later than those on heavier types of soils, being fully matured and ready to harvest earlier than the latter, when all other conditions were equal. Although our experience in the past has been that, on the average, the grey soils produce the heaviest-yielding crops when proved methods such as deep submergence, effective weed control, correct preparation of the land and facilities for water control and drainage are applied. the red soils prove the safest for the cultivation of rice on the Murrumbidgee Irrigation Area, for the reasons already stated, and also because owing to their situation they invariably drain off and dry out quicker and ketter, thus enabling the work with heavy harvesting implements to be carried out with a much greater degree of safety.

The weather during the middle of December and January warmed up considerably, the temperature gradually rising, until in February a very hot spell occurred and the weather became almost unbearably hot. During this month and March the rice plants throughout the area went shead in a

remarkable fashion, and by the end of March and middle of April those crops which had been planted during the recognised correct periods of the season had made such headway that they were not more than one or two weeks later in maturing than has been the case in past years when the seasons have been more favourable throughout the growing period of this cereal.

Owing to the lack of early frosts a number of the late maturing grains in the early crops did not colour up (lose their green appearance) as quickly as could be desired. Consequently some of the growers who found themselves in this unenviable position with everything at stake and the possibilities of severe losses occurring with a crop at this stage through lodging, hail, or continued wet weather, went on with their harvesting operations, with the result that some of the early deliveries to the Rice Marketing Board were barely up to the required standard of Paddy rice; more especially did this apply to the crops grown on dark soils (grey clay loams), and soils of uneven texture, such as crab-holey and puff country.

In most instances the crops were fully matured before draining operations were completed, but several cases were again noted where the evaporation period was commenced too early and the water was allowed to get away altogether too soon, the result being an uneven ripening of the grain, delayed maturity (some husks not having any grain of any description), grains of uneven size, and a tendency to crack. To obtain the heaviest yields and best quality Paddy rice it is necessary to keep the water on the crop until the last few grains at the base of the heads are out of the milk stage, and in the dough stage; the evaporation period which lasts for a further seven to fourteen days (approximately) should then take place, otherwise loss of weight will occur through the grain not being fully filled, green grains may find their way into the bags, and there is a greater possibility of the grain cracking when being taken off with a header. Care must be taken in draining off any remaining water, not to carry out the operation too quickly, but to extend it over several days at least, as otherwise the plants which are laden with a heavy weight of grain are likely to lodge.

Judging was completed on the 8th May just prior to squally rainstorms, which held up harvesting operations for some days. A subsequent inspection was made on 16th May of a number of the heavy-yielding entries which were being harvested. It was found that some of them were showing signs of lodging, but only sufficient to make harvesting operations a little awkward in places.

#### The Winning Crops.

Mr. R. St. Chad Young's winning crop, grown at South Yanco on a red clay loam, and estimated to yield 200 bushels per acre, was the finest crop of rice over a large area yet seen in this district; it scored heavily for

condition, evenness and appearance of the crop, effective methods of weed control, preparation of land, and facilities for irrigation control and drain age. The whole area was until recently a network of McCaughey check banks and channels. These have been filled in at considerable expense and the whole area under rice has been graded and checked in a most methodical and workmanlike manner. Mr. Young's channels and checkbanking system are an eye-opener and enabled the whole 100 acres to be submerged to a depth of 9 to 15 inches. The crop was exceptionally dense, clean and even with just a trace of fine cumbungic on the banks, and in some bays here and there.

The crop placed second, grown by Mr. N. S. Ellis at South Gogeldrie on part red clay loam and part grey clay loam was almost as fine an entry as the winning crop, and was also estimated to yield 200 bushels per acre. It



Mr. R. St. C. Young's Winning Entry.

was exceptionally clean, and with Mrs. Young's third-placed entry, war awarded the highest points throughout the competition for effective methods of weed control, there being just a trace of cumbungie in some bays, but very little on the checkbanks owing to the land having been sown with rice prior to constructing them. Mr. Ellis was unfortunate in losing a number of points for condition, appearance and evenness of crop owing to a considerable amount of lodging in patches due to the uneven texture of the soil, a matter over which he had no control, and is also to be congratulated on having grown one of the two heaviest yielding crops yet seen since the commencement of rice-growing in Australia.

AWARDS in Yanco Rice-growing Competition, 1929-30.

*****		8 00m	.pour	юш, т	020-00.			
Competitor.	Preparation of land, including seed bed, facilities for irrigation control, and drainage. (Max. 50 points.)	Freedom from weeds. (Max., 1st crop, 20 points; 2nd crop, 25; 3rd and subsequent crops, 30 points.)	Condition, appearance, and evenues of crop. (Max. 25 points.)	Apparent yield. (One point for each bushel of apparent yield.)	Suitability of rotation for second and subsequent crops. (Max., 2nd crop., 5 points; 3rd crop., 15 points; crops, 15 points.)	Effective methods of weed control. (Max., 10 points.)	Exhibiting sheaf at Show. (Max., 10 points.)	Total points.
R. St. Chad Young, Farm 1684. South Yanco N. S. Ellis, Farm 1704, South Gogeldrie Mrs. C. H. Young, Farm 1448, Murrami L. Sutton, Farm 1686, South Yanco H. H. West, Farm 1675, South Yanco W. Edwards, Farm 367, Leeton C. W. Pike, Farm 1697, South Gogeldrie Mrs. C. H. Young, Farm 1448, Murrami R. W. Fields, Farm 1692, South Gogeldrie E. M. Willis, Farm 1128, Calorofield P. L. Clemson, Farm 1708, South Gogeldrie W. H. Sayers, Farm 1468, Murrami W. Edwards, Farm 367, Leeton W. Edwards, Farm 367, Leeton K. B. R. Harrison, Farm 1132, Calorofield W. Playford, Farm 1702, South Gogeldrie A. J. Locock, Farm 1466, Murrami H. A. McDonald, Farm 151, Leeton A. D. Mackellar, Farm 740, Leeton	47 42 46 39 42 42 37 46 43 41 42 39 40 44 38 45	18 18 23 17 18 17 18 19 18 16 17 16 17 18 18	23 17 23 18 21 21 16 23 17 22 21 17 19 19 20 14 20 21	200 200 165 185 175 180 160 165 165 165 155 150 150 150 135	3	8999788866876778777888	10 10 10 10 10 10 10 10 10 10 10 10 10 1	306 296 279 276 274 267 266 263 257 256 253 251 247 245 243 241 241
S. H. Cox, Farm 1710, South Gogeldrie A. J. Southgate, Farm 1700, South Gogeldrie L. Jamisson, Farm 479, Stoney Point W. S. Martin, Farm 983, Wamson D. J. Coote, Farm 1690, South Gogeldrie T. Darchy, Farm 1097, Murrami Major Dooley, Farm 270, Leeton	43 41 39 38 38 39 37	19 18 17 17 15 17	20 19 21 20 16 19 16	140 145 140 140 145 130 140		8 7 7 6 7 5	10 10 10 10 10 10	240 240 234 232 230 222 222

#### General Comment.

The general standard of the crops judged was high and surpassed that of any previous competition, and the entrants are to be congratulated on having adopted the proved methods in the cultivation and preparation of the rice bays, control and handling of water, and weed control, with such excellent results. There is no doubt that the adoption of the more recent and improved methods as applied by the most successful growers during the past year or two was responsible for greater yields being obtained over larger areas this season throughout the Area, than in any other year on record, and undoubtedly the competitions have in no small measure been responsible for bringing this valuable information under the notice of the rice-growers.

Better grading, larger check banks and ditches which allow deeper submersion, and weed control, coupled with shallow sowing resulting in a better and more even germination, are a few of the ideas which are now being universally adopted throughout the Area. The winning entry was grown in 9 to 15 inches of water, while the second and third placed creps and many of the other heavy-yielding entries were grown in water 9 inches to 1 foot deep.

As was the case last year, the whole of the entries were of the variety Caloro. With the exception of a little of the early-maturing varieties Taisho and Yosemite, Caloro is practically the only variety grown commercially on the Yanco Area at the present time, due entirely to the fact that Colusa, which undoubtedly did well here, became badly infested with red rice and its variants, and the growers, acting upon warnings to this effect given at the close of the 1927-28 season, discontinued sowing Colusa for the time being.

Out of the total of twenty-six crops judged, twenty-three were grown on land not previously used for rice culture, while the remaining three—Mrs. Young's two entries and that of Mr. A. D. Mackellar—were grown on land which grew rice last season, and were portions of the 100 acres from which the first and second placed crops in last year's competition were selected, when the yields were estimated at 170 bushels and 175 bushels per acre respectively. The following particulars are given with the object of making a very interesting comparison between two entries grown on grey land with different soil textures, and of showing the effects of adverse seasonal conditions upon them.

One of Mrs. Young's entries was placed third in this year's competition with an estimated yield of 165 bushels per acre, which is a remarkably fine performance, considering the advantages which virgin rice land has over soil which has grown a crop of rice the previous season. This crop germinated well and made an even growth throughout. It appeared to be almost equal in yield, cleanliness and other respects to the crop grown on it last year; this was only made possible by the amount of hand-weeding carried out on this property during the growing period of both crops. The soil was a grey clay loam of much lighter texture than Mr. Mackellar's entry, which was grown on a heavy blue-grey crab-holey soil of uneven texture. Both crops were sown at the same time (late October) at the same rate of scoding (120 lb. per acre), and were also watered at the same time (during late October).

Irrespective of the fact that a crop of rice had been grown there the previous season, the type of soil of Mr. Mackellar's entry required considerable nursing, patience, and skilful handling on the part of the grower to obtain anything like a satisfactory germination during the cool springments, which proved unfavourable to these dark heavy soils, with the result that the estimated yield (135 bushels per acre) was 30 bushels per acre less than on Mrs. Young's entry.

The early submergence methods which were adopted with great success as the only means of combating the grasshoppers last year, when they were found to be attacking the young green rice plants, were again adopted by a number of competitors, as well as many other rice-growers throughout the

Area. Incidentally this infestation last year was mainly responsible for the subsequent departure from our original idea that it was necessary to repeatedly water and drain off bays when seed had been sown under the surface of the ground, thus keeping the land in a moist condition until the plants had reached a height of approximately 6 inches, and then to submerge the bays.

The entries placed first and second were grown on a red clay loam, and a grey and red clay loam respectively, and were the heaviest yielding crops over a large area yet seen in these parts. They were both watered and drained off once only; as soon as the grain struck the bays were submerged, the young rice plants being not more than 2 inches under water at the lowest ends of the bays; the depth of water was gradually increased with the growing plants in the usual manner until the full depth of submergence—9 to 15 inches—was reached. This method, where applicable, has many advantages over the original method which must perforce still be followed on many of our rice farms owing to the contour of the land, type and texture of some soils, and possibly detrimental seasonal conditions.

As well as being labour-saving, early submergence is one of the principal means of controlling weeds, such as barnyard grass, and where weeds are absent yields are naturally greater. It must be remembered that this method, and modified forms of it, are only advocated where bays are sufficiently level to allow of the very young rice plants at the lowest parts of the bays being covered with a shallow depth of water—approximately 2 inches—otherwise they may receive a set-back or be destroyed altogether, as indeed has been the case with some rice-growers on all types of soils.

#### Seeding.

There appears to be no apparent reason for altering the present recommended rates of sowing with the drill—90 lb. to 110 lb. per acre on new land, and up to 130 lb. per acre on land which has previously grown rice.

Eleven of the thirteen crops estimated to yield 3 tons per acre or better were sown at the rate of 100 lb. to 110 lb. per acre, while the remaining two, one of which was grown on second-year land, were sown at the rate of 120 lb. per acre.

The careful selection of rice seed showing as little variation from the true Caloro as possible has been carried out this season, and the Rice Marketing Board has made arrangements to store a large quantity separately at both the Murrami and Lecton sheds to enable growers requiring seed for the coming season to plant their fields with the best available type of seed.

#### Weed Control.

The efforts made to control weeds, particularly Barnyard grasses, by all the competitors, were of the highest order, and the excellent results obtained indicate that this serious menace to the rice industry is fully appreciated by the growers. A little cumbungie (Typha latifolia) was seen in a number of rice fields, mainly growing on the check banks. As this plant has

become a greater menace to rice-growers each year, the sooner it is tackled by all settlers the better. Providing the check banks are put up during September or later, when the danger of frosts is not so great, the most effective method of controlling cumbungie and other weed growth and preventing the shedding of seed about the rice fields, is to sow two drill widths of rice seed where all check banks are to be constructed, and as many drill widths as required where channels and drains are to be placed. The subsequent growth of rice on the banks is advantageous in many respects, for as well as having a smothering effect on all weed growth it binds the check banks, preventing a degree of washing down, while that 18 inches or 2 feet of land which cannot be sown by a drill after the banks are constructed is sown. The rice over the whole of the check banks may muture and be harvested, as was done on some properties this year where the banks were sown in this fashion. In any case the whole object is weed control and this rice is excellent feed for sheep.

Drilling the seed just prior to constructing each check bank is recommended in preference to broadcasting seed over them, as the seed becomes well distributed by the delver throughout the banks. The sowing of bays at the same time is not recommended early in the season, as the risk of partial germination or damage to the seed is too great if the check banks are constructed any length of time prior to the first watering.

#### NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.

THE Co-operative Bud Selection Society, Ltd., supplied the following selected Valencia Late orange buds to nurserymen during the 1929 budding season, trees from which should be available for planting during this present year:-

				Buds.
T. Adamson, Ermington		***	***	3,100
T. Eyles, Rydalmere	• •••	***		3,500
F. Ferguson and Son, Hurstville	•••	***		1,500
R. Hughes, Ermington		***	***	1.000
G. McKee, Ermington			•••	3,000
L. P. Rosen and Son, Carlingfor	i A Clata of	Wantan.		
Swane Bros., Ermington	or (respe or	որբառ	***	11,400
" HONSHITHER "SOLE DIVENCE	• •••	***		500

-C. G. SAVAGE, Director of Fruit Culture.

#### INFECTIOUS DISEASES REPORTED IN JUNE.

THE following outbreaks of the more important infectious diseases were reported during the month of June, 1930:-

Anthrax	140		•••	• • •	***			Nil
Blackleg	. ***	_ :**			***	•••	***	5
Piroplasmo	sis (tic	k fever	:)	***	***		***	Nil.
Pleuro-pne	amonia	conta	giosa	***	***	***		3
Swine fever		***	••	•••	***	***	•••	Nil.
Contagious	pneun	aonia	***	***	•••	***	***	2

-Max Henry, Chief Veterinary Surgeon.

#### A Sanitary Dairy Bench.

J. D. L. McGIBBON, Dairy Instructor.

A DRITY dairy bench has frequently been responsible for the production of second-grade or inferior eream. On most farms the dairy bench is made of wood, which, being of a porous nature, absorbs small quantities of milky water each time the washing up is done. Before very long, unless very carefully attended to, it becomes an evil-smelling and fat-saturated source of infection to the dairy utensils. No matter how carefully the utensils may be washed and scalded, if they are placed on a dirty bench, sufficient bacteria may be picked up to contaminate the dairy utensils and thus produce an inferior quality cream. In one case that came under notice the

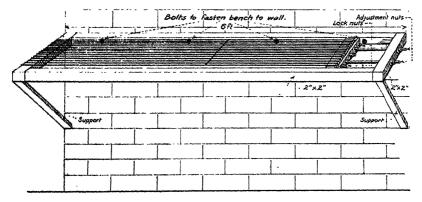
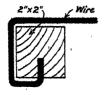


Fig. 1 .- Sketch of a Sanitary Dairy Bench.



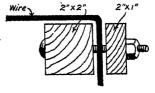


Fig. 2.—Showing how the Wires are attached to One End of the Bench.

Fig. 3.—Illustrating how the Wires are attached the Other End of the Bench.

farmer had made a dairy bench from the crates in which his milking machine and separator had been packed. The crate timber was unseasoned pine studded with knots, and the resinous odour which it contained was imparted to the hot utensils after each scalding, causing second-class cream.

A very suitable dairy bench, free from the objections of the wooden bench, may be made of strands of No. 8 gauge galvanised wire in a wooden frame. It is so constructed as to permit adjustment and tightening like a wire

mattress, when beginning to sag. About 100 feet of this wire will be required, and in addition, the following material is necessary:—

```
2 pieces ?-inch x 2-inch hardwood timber 6 feet long.
2 ,, 2-inch x 2-inch ,, 1 foot 6 inches long.
1 piece 2-inch x 2-inch ,, 14 inches long.
1 ,, 2-inch x 1-inch ,, 14 ,, ,,
2 long bolts and nuts (galvanised).
3 short ,,
```

The hardwood frame is constructed with either mortised or halved joints. At one end fifteen holes (of a size to admit the strands of wire) are bored on the under side to a depth of about ½ inch, equally spaced, and arranged so that the outside hole on each side is just inside the side pieces of the frame. Strands of wire each exactly 6 feet in length are attached, as shown in Fig. 2, and the other ends of the wires are attached, as shown in Fig. 3, to the piece of 2-inch x 2-inch timber 14 inches long and clamped in place by three short bolts and the 2-inch x 1-inch timber. The wires are then pulled taut and the two long adjustment bolts and nuts put in place, the whole tightened up, and the lock-bolts tightened. The bench is then bolted to the wall and supports constructed as in Fig. 1.

A single strand of wire can be used as a spacer for the other wires by soldering it across the centre of the bench.

#### WEIGHTS OF PIGS SUITABLE FOR ENGLISH MARKETS.

THE live and carcase weights of pigs suitable for different trades in the English market as given by the Ministry of Agriculture are as follows—

	Live Weight.	lb.	Approximate Dead Weight Ib.
Pork	Porkers Porkets Cutters	90 to 100 100 to 125 125 to 180	60 to 80 80 to 100 100 to 140
Bacon	Sizeable Stout Overweight	180 to 240 240 to 270 270 to 290	140 to 180 180 to 200 200 to 210
Pork (heavies)		290 and upwards.	210 and upwards.
Inferiors	*** *** ***	All sows after one litter.  Badly finished, faulty pigs.	r
Stores	*** *** ***	Immature pigs of any weight.	

"Porkers" represent the prevalent demand in London (Smithfield) and the south of England generally, also in certain large towns, such as Newcastle-upon-Tyne, Leeds, and Hull; "porkets" and "cutters," the chief demand in the Midlands. Still heavier pigs are taken by the pork trade in several scattered large towns, especially in the Midlands and the north, and are in general demand for the sausage and manufacturing trade.

The contracts between Danish curers and farmers specify carcase weights between 132 and 158 lb. weight, with deductions for any outside these limits, and a premium for special quality pigs suitable for export of carcase weights within the narrow limits, 139 lb. to 150 lb. Danish production has become so standardised that the majority of the bacon exports are from carcases in this premium grade.

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will take effect as from the 1st July.

The new price will be £12 12s. per ton free on rails, less  $2\frac{1}{2}$ % for cash, and at this price supplies of Sulphate of Ammonia can be obtained, as usual, from all fertiliser manufacturers or their agents, or direct from the Australian Gas Light Co., Haymarket, Sydney; or the Broken Hill Proprietary Co., Ltd., Newcastle.

Sulphate of Ammonia literature, and advice regarding the use of fertilisers, direct from

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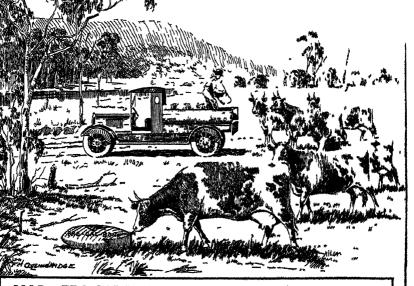
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#### Raising Fat Lambs.

THE PRESENT POSITION, PROSPECTS, AND REQUIREMENTS OF THE INDUSTRY.

E. A. ELLIOTT, Sheep and Wool Expert.\*

The fat-lamb industry was never so important to this State as it is at present. With low wool prices and a sheep market at the lowest general level for many years, the sheep raiser in numerous cases is faced with the fact that his receipts are smaller than his expenditure. The factor in the situation which is his to arrange is the production, and every grower must realise that the time has come when nothing but the best should be carried. In fact, with the present condition of a large area of the State where hand-feeding is general, it should be recognised that only first-class sheep are worth the expense of buying feed.

The production of fat lambs suitable for export is an avenue whereby better returns should be made by the grazier or sheep breeder who is in a position to carry out this line of breeding. At present we only have a small export trade and it is badly distributed over the year. Our general aim should be to produce a more or less regular supply of lambs throughout the year, and increase that supply so that our name will become better known and our lambs in greater demand each year. With our range of climatic conditions it should be possible to produce that supply of lambs throughout the year.

#### The New Zealand Standard as an Ideal.

Those of us who saw the exhibit of fat lambs in the Meat Industry Board's pavilion have learnt quite a lot about the ideal export lamb, and the Board is deserving of great credit for its enterprise. The carcases produced by some of our own breeders show that we can produce very good fat lambs when we set out to do it, but after inspecting the lot of lambs from New Zealand we can also see where we have room for improvement. These New Zealand carcases are certainly a picture of symmetry as regards shape and conformation, with the short, dumpy body and legs, thick shoulders, meat right down the legs, and with fine light bone. A mental picture of these lambs should be always before our fat lamb raisers, and they should continually strive to produce lambs nearer to that ideal.

#### The Influence of Feed.

We must recognise that New Zealand has much better conditions than ours are generally, but that should not deter us, for quite a lot of our country is very suitable to producing a first grade lamb. The value of feeding cannot be too greatly stressed. It is shown very forcibly in the

<sup>\*</sup> Notes of a lecture given at the Sydney Royal Show, April, 1930.

lambs from New Zealand; there is no excess fat in any part, and the kidneys of those lambs are only reasonably well covered with fat. An uneven system of feeding and forcing lambs will result in a lumpiness and excessive fat which is not desired. It should always be borne in mind that the perfect lamb is not the very fat one, and it can only be produced by the regular use of high quality feed.

It can be stated quite definitely that very rarely will prime lambs beproduced off natural pasture, and therefore special feed should be provided to be available during the growth of the lamb. Over the bulk of that area of the State suitable for fat lamb raising, an autumn or early winter lambing is usual, and in these areas it should always be possible to provide feed in the way of fodder crops sown specially for the purpose. This should work in with the general farming system, and serve as a rotation for the wheat crop. A number of crops may be grown, but outs is the most suitable; it is succulent and supplies a large bulk of feed, and also acts as a check to some of the wheat diseases. There are a number of varieties, suited to different conditions, to choose from. The fedder crop should be available some time before the birth of the lamb so that the ewes will have a good milk supply when the lambs are born. In the colder districts where a spring lambing is practised, it will still be possible to grow fodder crops. Oats may again be found the most suitable, or some of the summer crops such as Sudan grass may be tried. Wherever possible all fat lumb raisers should have one or more paddocks of lucerne, which is recognised as the "king of fodders." Even in the outer fringe of the fat lamb raising areas, paddocks sown with lucerne for grazing have given wonderful results. Where grass seed is liable to give trouble, a paddock of luceruc will assist in getting the lambs away before the dangerous period arrives.

As stated earlier, the production of export lambs off natural pasture, should not be considered except in special cases, such as in some of our western districts in a good season. A large proportion of our pastures however, can be improved by top-dressing, and in some cases by growing better grasses and clovers so that the feeding value is greatly improved.

Thus it will only be by the growing of fodder crops, sowing of lucerne, improvement of the pastures by top-dressing and sowing of better grasses and clovers, that we will be getting nearer to the ideal "feed standard" required.

#### The Ideal Export Lamb.

The type of lamb required for the export trade is one which is plump, well-shaped and sappy, weighing between 30 and 40 lb. dressed weight, at or before the weaning stage, i.e., about five months; 36 lb. is considered the ideal dressed weight. Slightly heavier weights are not objected to, so long as the lamb is not dry and old, and lighter weights also will sell if fat and plump, but slab-sided, leggy lambs do not meet the requirements of the market and only realise low prices. One of the disturbing factors in the lamb market this season, has been that thousands of lambs have

been marketed (of necessity) when not in a prime condition. The main point is that there must be plenty of bloom, and this can only be assured by giving the lambs the best possible conditions, right up to the time they are trucked.

To market this type of lamb, good feed, and plenty of it, is essential at all times during the growth of the lamb. Any check due to a shortage of feed means a decrease in the milk supply from the mother, besides a smaller amount of feed collected by the lamb itself from the pastures, and this leeway can never be properly made up in the short time before the lamb should be marketed. The lamb must therefore be grown during that season of the year when the best feed is available, and should be marketed before the pastures have begun to dry off. The drying of the pastures will mean a drying of the lambs, and, therefore, a loss of that particular sappiness and bloom which is so desired.

#### The Type of Ewe.

When considering the type of ewe, several aspects of the case must be considered, and perhaps the most important of these is availability. Because of the greater numbers bred it is always possible to buy Merino ewes, but the same cannot be said of comeback and crossbred ewes, good even lines of which are often very hard to obtain. This fact must be borne in mind when considering the purchase of ewes for lamb-raising, and it indicates that whether suitable or not, in numerous cases the Merino ewe will be used because other types of ewe are not available. As a mother for the production of a first-class export lamb under average conditions, the pure Merino ewe cannot be regarded as entirely satisfactory. mature slowly, and compared with the crossbred ewes do not give high lambing percentages; they are not good mothers, have a smaller supply of milk, and when mated with British breed rams experience more difficulty in lambing-all of which are important points in the production of fat lambs. The ideal ewe is a big-framed, roomy, early-maturing type with a good milk supply, giving a high percentage of lambs and looking after the lambs properly.

Despite the disabilities mentioned, the fact remains that often Merino ewes are the only ones obtainable, and in such a case, big-framed, plain-bodied ewes should be selected, and the best results will usually be obtained by joining with them rams of one of the longwool breeds.

The breeding propensities of the ewe must also be considered. In the hotter districts an early mating is desirable so that the lambs can be sold before the grass seeds begin to be troublesome in the spring. It has been found that crossbred ewes will not mate readily in the early part of the summer or during the hotter months in those districts where an early mating is desired, and this is specially noticeable when the ewes have been procured from a cooler district. An endeavour should be made to secure ewes bred under similar conditions to those where they are to be run, but in certain districts the crossbred is unsuitable for the above reason.

Comeback ewes will breed more readily than crossbreds, while the Merino will breed almost at any time, and considering the fact that Merinos can always be procured, it can be assumed that Merino ewes will be used in greater numbers in the production of fat lambs, despite the disabilities under which they labour as compared with crossbred ewes. The farmer who has to use them will be able to set off against the greater value of the lamb from the crossbred ewe, the advantage of this earlier mating—the earlier dropped lambs which are obtained with the Merino. The added value of the fleece of the Merino ewe will also help to balance the scales, although it has to be remembered that when run continuously on cultivation ground, the wool of the Merino depreciates to a creater extent than the wool of crossbreds under like conditions.

Comeback ewes will give a more valuable fleece than crossbreds, but being nearer to the Merino and smaller in frame will not give such an early-maturing lamb. The lambing percentage from comeback ewes will not be so good as from crossbred ewes.

It is not always possible to secure the exact type required, but the flock of ewes for fat-lamb raising should not be the culls from a wool-growing flock. The aim is to breed an even lot of lambs with a desired shape, &c., and this is not possible unless strict attention is given the flock to have the ewes as even and as near the ideal as possible.

#### Use a Pure-bred Sire.

Under average conditions it must be granted that the best fat lamb is produced by mating one of the Down breeds with a first class longwool-Merino ewe. A pure-bred ram of whatever breed is desired should always be used, a choice being made from some reputable breeder. An even drop of lambs, both in size and quality, should be aimed at, and this will not be obtained if any nendescript ram is used. A ram of this sort has no fixed characters itself, and cannot be expected to imprint desirable characteristics upon its offspring, and in fat lamb raising a special breed of ram should be used so that certain important qualities will be present in the lambs, such as early maturity, shapely carcase, good mutton qualities, &c.

#### The Breed of Ram.

In New Zealand the bulk of the export fat lambs are sired by Southdown or Romney Marsh rams, whereas in this State at the present time a number of different breeds are being used; some of them, such as the Southdown, Dorset Horn, and Ryeland, have special qualifications for mutton production. There are practically no Shropshire rams in the State, though this breed would also be suitable. Other breeds, of the British longwools, are used to a certain extent because of climatic and other conditions, and the Corriedale is also utilised.

The use of rams of all these breeds does not make for uniformity in the class of lamb produced, but because of the wide range of conditions of climate and pasture in our State, there must always be a greater range of sires than in a country such as New Zealand. As we work towards perfection we will naturally limit the number of types of ram in our more favoured areas, and there the choice will eventually be one of the Down breeds. Where the season is not so certain, a more hardy animal and one which will mate more readily at the season of the year required will have to be used, and there the choice will have to include one or other of the long-wools—the Border Leicester, Romney Marsh, and English Leicester, depending on the conditions—in addition to the Dorset Horn. The Corriedale will be used under somewhat similar conditions to the Romney Marsh.

All these breeds have their qualifications for fat lamb production in the order mentioned, but the essential point is that the ram must be a good quality animal of that particular breed and one which will transmit its characteristics to its progeny.

At least 2 per cent., and, if possible, 2½ per cent. of rams should be used. It is an excellent practice during mating to yard the ewes and rams for the night once a week. This will increase the lambing percentage.

#### The Mating Period.

It is a bad practice to have an extended lambing. Besides resulting in an uneven lot of lambs and perhaps interfering with other operations, it means a long period during which extra attention is required by the ewes. The lambing period is controlled by the length of time the rams are running with the ewes. If the ewes are in a satisfactory condition, and if sufficient healthy, active rams are used, six to eight weeks is quite long enough to leave the rams with the ewes after they begin to work.

The period of gestation is about 150 days, or, roughly, five months.

#### Care at Lambing Time.

In arriving at the final and exact return from the lambs, the number and value of ewes which die or which lose their lambs at lambing time is often an important item, and one which materially affects the cheque from the lambs.

When crossbreeding, a certain amount of trouble may be expected, but the losses may be minimised by using well-grown ewes with roomy frames, and by giving the ewes extra attention during lambing. The fleck should be visited in the early morning and perhaps again towards evening; cases requiring assistance will then usually be noticed in time to save the ewe and the lamb. The early morning visit is most important, as it is at that time that assistance is usually required, and it is in the early morning also that the crow claims most of its victims.

#### Marking the Lambs.

It is most important that the lambs should suffer no check during their growth. For this reason they should be marked before they are too large, about three to four weeks being the best age. This necessitates a second marking at the end of the lambing, but if the general marking is done at

that time some of the lambs will be very large and they will lose a good deal of blood. The wounds of the large lambs take a long time to heal, and a decided check in growth is occasioned.

Great care should be exercised in catching the lambs for marking or bruising will result. It has been shown that from 10 to 15 per cent, of the lambs rejected at the meatworks are animals with big joints and torn muscles in the hindquarters, due to being enught by the leg and wrenched when the bones and muscles were immature.

On account of the tendency for the young flesh to bruise very easily the lambs should be handled as little as possible, especially near the time of marketing.

#### Shearing.

Lambs intended for sale direct from their mothers should not be shorn. The value of the wool will not compensate for the reduction in the quality of the flesh, due to the handling and bruising. Besides, a shorn lamb does not look attractive and rarely realises a good price in the market. The principal item in fat lambs is the flesh, but the pelt has a certain value, which is reduced to practically nil if the lamb has been shorn. However, if the season is much earlier than usual and grass seeds begin to affect lambs too small for market, it may be necessary to shear them, and perhaps keep them a little longer than usual.

#### BLACK SPOT OF GRAPES.

If the abnormally rainy weather characterising this winter in the metropolitan district and other parts adjacent to the coast is followed by a wet spring, states Mr. H. L. Manuel, Viticultural Expert of the Department, black spot is bound to make its appearance. Under conditions favourable to its development such varieties as Doradillo are very susceptible to this disease, and to a less extent Gordo Blanco also is liable to attack. In the circumstances it would be advisable for growers in the districts referred to who are cultivating these varieties to swab their vines with the sulphate of iron and sulphuric acid solution recommended by the Department. The formula and method of application are given in a leaflet, which can be had on application to the Under-Secretary, Box 36A, G.P.O., Sydney.

#### SUBDIVIDE YOUR GRAZING AREAS.

We have proved at Aberystwyth that constant cutting or very heavy grazing retards the root development of the plants, and that it does so—although to a lesser extent—even under top-dressing. Maximum benefit from top-dressing is, therefore, only compatible with well controlled intermittent grazing—alternate hard grazing and spelling. Top-dressing without adequate subdivision of paddocks is at the best wasteful, and at the worst positively harmful—Prof. R. G. Stapledon. Director of the Welsh Plant Breeding Station, Aberystwyth, Wales.

## Toxaemia of Pregnancy.

PREPARTURIENT PARALYSIS, OR LAMB SICKNESS.

H. G. BELSCHNER, B.V.Sc., District Veterinary Officer.

This discuse is also known by a number of other names, including antepartum paralysis, parturient paresis, and twin lamb disease. It is considered, however, that the most appropriate name is toxaemia of pregnancy, as this appears more exactly to describe the condition.

The disease is a nutritional disease associated with pregnancy. Breeding ewes are therefore the sufferers, they being apt, when carrying their lambs, to put on fat freely, to become lazy and to take too little exercise, and to degenerate in health and vigour in consequence.

The disease occurs in pregnant ewes shortly before lambing, and those ewes carrying twin lambs are most likely to be affected. A good season is conducive to the disease, but the trouble may also occur during a dry season, when sheep are fed on concentrated food or scrub and do not receive green feed nor get sufficient exercise in foraging for their feed. In the latter cases the ewes are not in an over-fat condition, but are usually in fair to good condition. Lack of exercise and an ill-balanced ration, combined with pregnancy, have resulted in an unhealthy state of certain of the internal organs, particularly the liver, with a resultant toxaemia.

#### Cause.

Toxaemia of pregnancy can result from several causes. Rich pastures and lack of exercise during pregnancy, especially from a fortnight to a month off lambing, are the commonest causes. Hence the disease is often seen on lucerne farms and small holdings, where high feeding and failure to give the sheep sufficient exercise bring on excessive fatness. Abundance of feed without exercise results in an excessive accumulation of food material in the body, and a failure of the organs to throw off poisonous body products. This predisposes the animal to lamb sickness by causing an auto-intoxication or resorption of poisonous products into the body.

The trouble also occurs on large holdings, and during dry periods when sheep are hand-fed. The cause is then usually to be found in the method of hand-feeding, and in the class of food supplied. The feeding of pregnant ewes on grain or concentrated foods without sufficient roughage, and in such a manner that the animals are not required to take much exercise, is likely to bring about the disease.

All pregnant ewes, irrespective of breed, are liable to this condition, but ewes carrying twin lambs appear to be more susceptible. Becoming heavy in lamb, they naturally only take what exercise is necessary to secure their daily food. If this is easily found, either on a luxuriant pasture or in the

form of concentrated food supplied regularly at the same place every day, the ewes take very little exercise. The likely result in the pregnant ewe is constipation and a general impairment of the normal function of the digestive organs, which may lead to toxacmia of pregnancy.

A further possible cause suggested by the results of recent research work undertaken in U.S.A. is calcium deficiency of the food supply, resulting in a low calcium content of the blood. Hence prolonged feeding on the one class of foodstuff low in calcium may bring on the condition.

#### Symptoms.

The early symptoms of toxaemia of pregnancy are seldom noticed by the average observer. Usually from a month to a week before lambing is due to commence, sometimes earlier, one or more ewes heavy in lamb may be seen to separate from the rest of the flock, and to be dull and "off feed." If approached, little or no notice is taken, and when actively disturbed, the affected animal will only move off very slowly in an aimless manner. appears to be blind. There will usually be exhibited a staggering gait, with partial paralysis of the hindquarters, and stupor. Later the animal goes down and will probably not rise again unless assisted. When lifted onto its feet it will stand listlessly, and if forced to move will stagger a few paces with swaying of the hindquarters, and then probably fall. There may be grinding of the teeth and clamminess of the mouth, and the wool is probably already beginning to lift. Sometimes there is a dark discharge from the vagina. Such a case, which is the common form of the disease, will last four or five days or longer from the onset of the symptoms. Finally, the animal goes down and lies in a semi-conscious state until death occurs. In the majority of cases, the trouble is only observed when the animal is in the latter stages, and so the course of the disease appears much shorter than is really the case. Sometimes lambing may take place, and the animal will recover. This is, however, usually followed by shedding of the wool.

In the more violent cases, the ewe, without showing any earlier symptoms. falls insensible to the ground and dies in a short time, with or without convulsions. A post-mortem examination shows the liver to be the most abnormal organ. The state of the liver is a most characteristic feature of the disease. This organ will be found, almost without exception, to be somewhat enlarged and to be pale yellow or greyish in colour. This is called fatty degeneration of the liver, and is due to a great deposition of fat in the cells of the liver, which seriously interferes with its functioning.

The kidneys may also appear abnormal and paler in colour, but this is not a constant feature as is the abnormality of the liver. The intestines are frequently found to be almost empty, but evidence of constipation, as exhibited by the contents of the lower bowel and rectum, being distinctly hard and dry, is often observed. In a big majority of cases twin lambs, usually within two or three weeks or less of full time, will be found. The month and the lambs are, as a rule, healthy.

#### Treatment.

Medicinal treatment of affected animals, unless in the very early stages, is generally useless. If the very first symptoms are noticed, good results may be obtained by giving the ewe a drench of 4 to 6 ounces of Epsom salts at once. If it is possible, 10 grains of calomel, mixed with butter or lard and given in the form of a pill, followed by a smaller dose of Epsom salts, is likely to be more effective. The calonel should be repeated daily for several days. If profuse diarrhoea or slobbering from the mouth occurs, the drug must be discontinued. Stimulants such as strong coffee may be given frequently. The above treatment would, of course, as a rule only be attempted in the case of valuable stud ewes. As extensive damage to the liver has probably already been done by the time symptoms are observed, an attempt at treatment is usually ineffective.

The sheep should immediately be moved to another paddock where feed is less plentiful, or attention paid to the feeding.

If an over-luxuriant pasture appears to be responsible for the trouble, and it is impossible to put the sheep into a paddock with less feed, the ewes should be driven about quietly without dogs for an hour or so each day to ensure that they receive exercise.

#### Prevention.

Breeding owes should not be in fat condition just before lambing. Many owners are in the habit of placing their ewes on extra good feed just prior to lambing, with the idea of creating a good milk supply for the lambs. This, although quite a common practice, is a mistake. Before lambing, all that the ewes require is a sufficiency of feed to keep them in good health and fair condition, but not an excess of feed, easily obtainable, which would be liable to induce laziness and so bring about an accumulation of fat in the Rather should the ewes be kept on comparatively bare pasture during the last month or so before lambing, where they will be compelled to travel for their food, and thus obtain each day the necessary amount of exercise to keep them in good health. If ewes are being hand-fed on grain, concentrated food, or other fodder, this should be scattered widely in the paddock or a trail made, so that the ewes will run backwards and forwards whilst feeding. It is a good plan to feed the ewes in a different place each day if possible, as sheep soon learn where the regular feeding place is, and will stand about waiting for the feed to be put out.

The time to provide an abundance of good feed for breeding ewes is not before they lamb, but after, when they are suckling the lambs.

A certain amount of green feed is of course very desirable before lambing commences, if it is available, but abundance of feed should be avoided.

On small farms, or on holdings which are totally under cultivation, such as lucerne areas, the position resolves itself into one of careful management. If adequate exercise is not possible for the ewes under the conditions prevailing, they should be stirred up and moved about quietly each day in the paddock for at least an hour. The exercise produces that stimulus to the muscles and to the liver which is necessary.

# A Farm-grown Balanced Ration Competition.

NOWRA AGRICULTURAL SOCIETY'S SHOW, 1930.

A. T. R. BROWN, Senior Dairy Instructor.

WHILE in Europe recently the writer had the opportunity of witnessing the methods of feeding dairy cattle as carried out in England, Scotland and Denmark. In those countries dairy cattle are housed for five to six months of the year, and the dairy farmer is forced, by circumstances, to make a study of feeds and feeding whilst stall feeding his dairy cattle during the period they are housed; otherwise his industry would not be profitable. Here in Australia farmers can dairy successfully for a great part of the year, relying solely on pasture, but there is always a lean period between the winter and spring when pastures require supplementing, either by stall feeding or bulk feeding in the paddock, in order to maintain the milk flow. Many dairy farmers are forced to buy both bulk and concentrate feeds during such periods, and in order to find out what those dairy farmers use who conserve their own fodder, the novel idea of having a farm-grown balanced ration competition to ascertain what balanced ration for milk production without the aid of bought concentrates could be produced in my district, was put forward, and a trophy given at the recent Nowra show for the most economical and best farm-produced balanced ration for milking cows.

Naturally, stall feeding calls for extra work, but in the long run it is more economical and satisfactory, as it saves waste, and each beast is allotted her proper share, which can be eaten at leisure without being hurried, as is the case when feeding is done in the paddock. With the stock-carrying capacity of the pasture kept up to the full, and in a number of cases exceeded, there is a growing tendency on many dairy farms in this district to stall feed cows when hand-feeding is resorted to. As the Illawarra district is one which is ideally situated for city milk supply, the maintenance of the milk flow throughout the year is a matter of importance. Economical feeding systems and practices are essentials to prosperous dairying in the city milk supply zone.

In awarding points for the competition, the following aspects of a balanced ration were taken into consideration:—(a) the nutritive ratio, (b) quality of the feed, (c) palatability, (d) succulence.

The analyses figures of the rations submitted in the competition were compiled from Henry and Morrisson's book Feeds and Feeding, 19th edition. [This is stated because different authorities give different pertentages of digestible nutrients in various feeds.]

The nutrients required for a milking cow are as follows:—

Dry Matter.
23 lb.
Protein.
24 lb.
Total Carbo-hydrates.
14 lb.

#### Ration Analyses.

The following analyses of rations exhibited by the prize-winners are interesting in comparison:--

#### FIRST PRIZE (93 points).

Cation,	Dry Mutter,	Digestible Protein,	Digestible Carbo- hydrates.	Fat.	Nutritive Ratio.
Maize silvee, 40 lb Lucerno chail, 12 lb Maize meal, 5 lb Pumpkins, 4 lb	10-52 10-90 4-47 -33	·44 1·27 ·37 ·04	6·0 4·68 3·39 ·18	·28 ·10 ·23 ·02	
Total nutrients	26-22	2-12	14-25	-63	1:7.3

#### SECOND Prize (92 points).

Ration.	Dry Matter.	Digestible Protein.	Digestible Carbo- hydrates.	Fat.	Nutritive Ratio.
Chaffed green maize, 40 lb Lucerno chaff, 12 lb Maize meal, 6 lb	0·24 10·90 5·30	·40 1·27 ·45	5-48 4-68 4-06	·16 ·10 ·27	
Total nutrients	25-44	2.12	14-22	·53	1:7.2

#### THIRD Prize (90 points).

Ration.	Dry Matter.	Digestible Protein.	Digestible Carbo- hydrates.	Fat.	Nutritive Ratio.
Lucerne chaff. 30 lb	27·4 3·4 4·47 35·27	3-18 -15 -37 3-70	11-7 2-05 3-39 17-24	-27 -06 -23 -56	1:5

#### Comments.

The winners were: First prize, Mr. J. R. Shepherd, Bolong, Nowra; second prize, Mr. H. J. Bate, Tilba Tilba; and third prize, Mr. G. Crawford, Nowra.

Naturally, owing to the absence of bought concentrates, the nutritive ratios of the submitted rations were not very narrow, the first prize ration having a nutritive ratio of 1 7.3. Nevertheless, it is quite safe to say

that if the average dairy cow in New South Wales received a ration with this ratio there would be a different story to tell as regards production in adverse times. The first prize ration had a very good base feed in splendidly made silage. The ration itself was suitably varied and succulent, being palatable and fairly well balanced.

The second prize ration had good quality lucerne chaff, but had not as good base feeds as the silage of the first ration. The third prize ration. although of narrow nutritive ratio, was too high in dry matter and total nutrients. With the quantity of lucerne chaff toned down a little. and extra green maize added, a better type of ration would have resulted.

#### TEPARY BEANS (Phaseolus acutifolius VAR. latifolius). From time to time some enthusiast recommends to the Department the

culture of Tepary beans, which are grown to some extent in America.

Several varieties of these beans have been obtained at different times. from America and tested for their value under our conditions. They did not appear to be of any value as a green manure crop by comparison with cowpeas, and as it was believed that they were mostly grown for their seed for use as a vegetable (in the same way as haricots), the opportunity was taken to get in touch with the Agricultural Experiment Station, Arizona, U.S.A., where these beans are most largely grown. A reply has now been received from Professor Ian A. Briggs, M.S., Assistant Agronomist at this Station, as follows:-

The White Tepary beans are native to northern Mexico and southern Arizona and have been used probably for hundreds of years by the Indians of this region as a food crop. They will grow and mature seed under more severe conditions of heat and drought than will practically any of the other crops grown in this region. They are liked especially by the Pima and Yuma Indians of southern

For many years they have been advocated as a desirable green manure crop for southern Arizona. However, we are finding that the cowpeas make more growth and are generally more satisfactory for this purpose. One of the chief advantages of the Tepary is that it seems to have the ability to mature seeds under almost any conditions, whereas, in many years the cowpeas fail to set seed. This crop is grown very little in Arizona and is being replaced by the cowpeas. It is still in some demand among the Indiana and Mexicans as a food crop. As far as general farm practice in this State goes, however, we might say that the eron is not used at all. that the crop is not used at all.

The Tepary beans have been tested at Grafton and Yunco for two or three seasons, and have made only poor growth, by no means comparable with cowpeas or soybeans as a forage or green manure crop. As a seed erop, only the White Tepary was considered worth testing as a dried haricot bean, but the yield was so poor even under irrigation at Yanco, that it has now been discontinued from further trial.

These conclusive trials indicate that the Tepary bean is not likely to be of any value in New South Wales. H. WENHOLZ, Director of Plant Breeding.

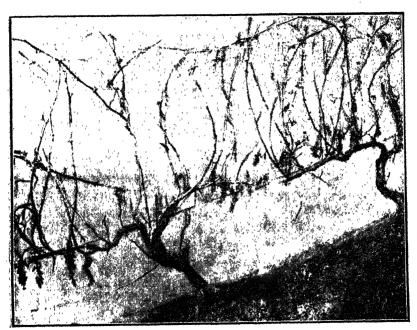
BOTATE the "night paddock" and rotate the grazing, and do not hesitate to use the mowing machine when grass will grow away from the animals.

## Copper Sprays versus Copper-containing Dusting Powders.

EXPERIMENTS IN THE CONTROL OF GRAPE VINE DISEASES.

H. L. MANUEL, Viticultural Expert.

Ar the present time in this State there are three main vine fungous diseases, namely, oidium, black spot (anthracnose), and downy mildew. Of these three, one can safely say that downy mildew is the worst to contend with and that it makes its appearance more frequently than the other two. This is so in the vineyard areas of this State, at all events.



Untreated Vines.

introduction and spread of downy mildew, vine-growers have had to work considerably harder, with consequent additional expense, in their endeavours to prevent serious or even disastrous loss from disease. Particularly does this apply to the moist vine areas which experience a fair amount of summer rain. The extra labour required, the materials, the spraying machines and their wear and tear have added to the cost of production, and growers naturally are at all times ready to seek and try out any new preparation that is likely to reduce this cost. Though dusting



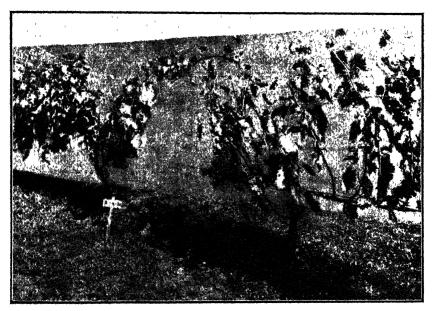
Powder-dusted Vines.



Sprayed Vines (Bordeaux 10-5-50).

powders themselves are more costly, their convenience in handling appeals from a working point of view. However, the main factor in applying either a spray or a dusting powder is the effectiveness of the material used, and convenience of application is only a secondary consideration.

The nature of the spore development of downy mildew makes it essential, under ordinary practical vineyard conditions, that we should control this disease as much as possible by preventive measures, and to do this we must use a material which not only acts as a spore poison, but one which,



Sprayed Vines (Bordeaux 6-4-50).

when placed upon the herbaceous portions of the vine, will possess certain qualities of adhesiveness and become available from time to time as the weather conditions for development of downy mildew are experienced.

Up to the present time no treatment has surpassed or equalled in efficiency the use of the long tried out Bordeaux and Burgundy sprays. Dusting powders, I understand, have been tried out now for many years past in France, and are used to a comparatively small extent as a supplement to the spray in certain bad seasons. Dusts may be found beneficial on account of their ease of application in periods when one cannot get a spray machine onto the ground, for instance, in times of abnormal rainfall, when the ground is too soft to carry the weight of a spraying machine. However, the spray should always he looked upon as the main. preventive, and if the spraying is carried out as it should be, not neglecting. the early applications, dusting should only be found necessary on rare occasions. I feel sure that if growers discard the spray in favour of the dust, sooner or later they will meet with more or less disastrous results,

#### A Black Spot Trial.

At the Department's Viticultural Nursery at Narara, where, besides the propagation of phylloxera-resistant vines, experiments and trials are conducted from time to time when the demand and occasion exist, trials were conducted some two seasons or so ago on mother stock vines



A Comparison-(Bordeaux 6-4-50) and Dusting Powder.

to ascertain the effect of a copper dusting powder on black spot. Three applications of the dusts were made and, as far as the checking of black spot was concerned, were not a success, the vines dusted being just as badly affected as those not treated. In addition, the vines that were treated lost practically all their foliage prematurely. This may have been caused by the effects of the sulphur in the dust. Although a copper spray is not as effective as swabbing with the sulphate of iron and sulphuric acid solution for black spot, experiments conducted by the Viticultural Branch have shown that it will give a certain amount of protection. Of course, the most satisfactory method of combating black spot is to use the winter swab and follow on in the spring and summer with copper sprays. .



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#### An Experiment in Downy Mildew Control.

Last season, owing to many inquiries being received from growers by the Department as to the effectiveness of dusts compared with the sprays, it was decided to conduct a small experiment so as to check the comparative adhesiveness of dusting powder against the ordinary copper sprays.

The trial consisted of twenty-four wine White Hermitage vines, treated as follows:—

Six vines were used as a check, and did not receive any treatment at all.

Six vines were thoroughly sprayed once with Bordeaux mixture of the 10-5-50 (copper sulphate-lime-water) strength.

Six vines were thoroughly sprayed once with 6-4-50 Bordeaux mixture.

Six vines were thoroughly dusted once with copper-containing powder.

The applications were made on 21st December before downy mildew had made its appearance. Downy mildew appeared on 6th January, and on the 13th January, after 144 points of rain had fallen from the date of the application of the sprays and dust, six average leaves from the vines from each treated plot were submitted to the Chief Chemist (Mr. A. A. Ramsay) for determination of the amounts of copper present on each set of leaves. Mr. Ramsay's report of the examination is as follows:—

GRAPE Vine Leaves: Sprayed with Bordeaux versus Dusted.

,	No. 1 (Sprayed with Bordeaux, 10-5-50).	No. 2 (Sprayed with Bordeaux, 6-4-50).	No. 3 (Dusted).
Number of leaves submitted for examination	6	6	6
Total area of six leaves (sq. ins.)	141-4	145∙5	144-9
Average area of each leaf (sq. ins.)	23.57	24-25	24.15
Total weight of copper found on six leaves-			
(a) Expressed in terms of cryst. copper sulphate (Grams)	0.180	0-200	0.00160
(b) Expressed in terms of metallic copper (Grams)	0.0403	0.0148	0.00036
Average weight of copper on one leaf			
(a) Expressed in terms of cryst. copper sulphate (Grams)	0.030	0-0333	0.00027
(b) Expressed in terms of metallic copper (Grams)	0.0067	0-0075	0.00006
Weight of copper found per square inch leaf surface—			
(a) Expressed in terms of cryst. copper sulphate (Grams)	0.001270	0-001370	0-000611
(b) Expressed in terms of metallic copper (Grams)	0.000285	0-000308	0.00000247
Relative amount of copper per square inch of surface	115.4	124.7	1.0

The area of leaves given above refers to one side only, and in the tabular statement the copper determined by analysis has been expressed in terms of that area, although spray residue was noticed on both sides of the sprayed leaves.

It will be noted that the sprayed leaves contained 115 times as much copper in the case of 10-5-50 Bordeaux and 125 times as much copper in the case of 6-4-50 Bordeaux as did the dusted leaves. The use of 6-4-50 Bordeaux has been recommended by the Department as the result of many years experience, and may, therefore, be taken as representing the standard required for effective fungus control.

The form or forms in which the copper (compound or compounds) is present in the dust used is not known to us, but even if it be assumed to be of equal fungicidal value to that in ordinary Bordeaux, which appears unlikely, and assuming further that the application of the dust has no injurious action on the leaf, then it is apparent that effective control of fungous disease would not be obtained by one application of the dust, or, stated in another way, it is apparent that 125 applications would require to be given before the leaf would have the same degree of protection as that afforded by one application of ordinary standard Bordeaux mixture.

The difference in the appearance of the vines was very marked when the photographs, from which the accompanying blocks were made, were taken on 12th April, after 1,527 points of rain had fallen over the period from the commencement of the trial.

Mr. H. G. White, Superintendent of the Narara Nursery, who assisted in conducting the experiment, reports the rainfall as follows:—

	1929.					4	1930.				
27	December			14	points.		March			18	points
30	,.	•••	•••	30	• ••	10		•••	•••	ŧŝ	**
	1930.					11			•••	207	**
1	January	•••		4ti	**	12		•••	***	107	••
12	17		•••	43	**	14		•••		ä	**
13	,,		•••	11.	,,	15		•••	•••	186	**
17	٠,		•••	5	**	17	, ,,	•••	•••	50	**
24	.,			234	",	18	,,			86	
25	,,			13	,,	19	٠,,			61	••
28	**			$^{25}$	11	21	**			36	••
17				54	•	27			***	54	**
18		• • • •		26	**	. 5	April	***		6565	19
20	19			G	**	11	•••			82	"
24	**			3	11	12				33	11
25			***	20	**		**	•••	•••		,,

On 19th May the vines were all defoliated, and I was able to note the condition of the wood. The wood or canes of the vines sprayed with 6-4-50 Bordeaux appeared in slightly better condition than that of the vines sprayed with 10-5-50 Bordeaux, but both these sprayed plots had healthier, stronger, and considerably less dead wood than was the case of the dusted vines. The general appearance of the sprayed vines was considerably better, and they did not have the quantity of unmatured wood that the dusted vines had. This, of course, can be accounted for by the fact that the dusted vines dropped their leaves prematurely.

From my experience and the data to hand, I cannot recommend copper dusts to take the place of Bordeaux sprays; growers should not forego the spray because dusting is an easier operation.

### Orchard Notes.

#### AUGUST.

C. G. SAVAGE and H. BROADFOOT.

#### Pruning.

Pruning may be continued during August on kinds and varieties of deciduous fruit trees that have not made the first signs of growth. This applies particularly to apples and pears in late tableland districts, but some varieties of peach trees that do not start growth till September can be pruned this month.

In the case of the cherry, with young trees that are still being formed and also old trees that it is necessary to cut back, it is preferable to delay pruning till just before they start into growth. However, after the lower part of the framework of the cherry tree is well established, it is preferable to desist from topping the leaders, contining the pruning to moderate thinning out, and in some cases shortening back some of the older laterals. This treatment is continued till the trees have settled into cropping. Later, if the fruit is running small or the tops have become too high and inaccessible, the trees can be topped back to requirements.

#### Ploughing.

Under most circumstances winter ploughing should have been completed by mid-July; if not, it should be pushed through as soon as possible. The main advantages of early ploughing are that the land is put into condition to absorb and hold the winter rains for the use of the trees later, the soil is exposed to the beneficial influences of winter frosts, the decomposition of organic matter that has been ploughed in is assisted, and the work does not clash with the busy period later when spraying and other spring operations must be carried out. Often one is tempted to delay winter ploughing to allow a green crop, either sown or volunteer, to develop further and make greater bulk of material to plough under, but an orchard carrying a green crop is in the very condition that makes early ploughing necessary, otherwise the crop will absorb much of the moisture that should be stored in the soil, and if a dry spell should occur in the spring, as often happens, the trees will suffer. Even though the spring be wet or the orchard can be irrigated, late ploughing-under of a green crop should be avoided, as the crop will have absorbed and locked up for a period much of the available plant-food which the trees require in the spring. By ploughing early ample time is given for the green crop to decompose and liberate these plant-foods again.

When the orchard has received an autumn or early winter ploughing (a very good practice, especially in dry inland districts where fruit is

grown without irrigation), and if the soil has not become compacted again or weeds have not sprung up thickly, it is permissible to delay winter ploughing. In fact, it is an advantage under these conditions, for besides the economy, ploughing can be delayed till at least part of the spring spraying, with its unavoidable trampling, is completed.

#### Planting.

With the exception of some of the early-starting stone fruits, planting of deciduous fruit trees can be continued this month, but when conditions are favourable it is preferable to have this work completed earlier. Deciduous trees make new root growth long before the tops shoot in the spring, and it is advantageous that this new root growth should be made by the trees in their permanent position, otherwise the effort is wasted.

In localities where late frosts do not occur (as in some parts of the North Coast) citrus trees can be planted now, but in places where frosts are likely to occur planting should be delayed till the normal frost period is over.

#### Grafting.

Root grafting of nursery stock can be started in July and continued this month. Bark grafting, either strap or simple, is extensively used for working over established deciduous trees of undesirable varieties. This can be commenced as soon as the sap is moving and the bark lifts freely. A bulletin on grafting is obtainable from the Department; price, 10d., posted.

#### Picking and Packing of Citrus Fruits.

The great importance of avoiding even slight injury to the skin of citrus fruits when picking or packing is far more widely recognised now than formerly, but still there are some growers and packers who do not give sufficient care to this work. Even slight bruises or abrasions become immediately apparent on many other fruits such as apples, but the character of the skin of citrus is such that slight abrasions or bruises are not so quickly apparent. If the fruit is despatched and consumed quickly no loss may occur, but if sales are delayed various decay organisms are likely to develop in even slight injuries to the skin, and heavy losses may occur. It should never be forgotten that careful handling must start with the picking.

#### Pests and Diseases.

Black Peach Aphis.—This aphid, when seen on peach, nectarine, apricot or Japanese plum trees while dormant, can be dealt with by adding a spray such as nicotine sulphate or tobacco wash to the dormant period applications of lime-sulphur, or by making a separate application of nicotine sulphate, tobacco wash or miscible oil spray while the trees are dormant. The trees should be carefully watched, and if the black aphids reappear at the time or soon after the trees break into growth, they should be at once

sprayed with tobacco wash (at the rate of 1 lb. to 2½ gallons water) or 40 per cent, nicotine sulphate diluted 1 to 800 by volume. The application should be made under good pressure (from 250 to 300 lb.), the nozzle being held close to all affected parts to break up the clusters of aphids. If any live aphids are found two days after the first application, another should be made at once. Aphids breed fast, and if a longer interval is allowed between applications, will breed up as fast as they are killed. Leaflets on the control of black aphis and the making of tobacco wash are obtainable from the Department of Agriculture.

Green Peach Aphis.—Recommendations for control of this pest were made in last month's Notes.

Black Cherry Aphis.—A careful watch should be kept on all cherry trees, and if eggs or young aphids are found, the trees should be sprayed with miscible oil, diluted 1 to 20 of water by volume, when the buds are well swollen. If at this period or when the buds show a slight green tip, young aphids are found but no eggs remain, 40 per cent. nicotine sulphate diluted 1 to 600 of water by volume (1 pint to 75 gallons), to which soap is added at the rate of 1 lb. to 25 gallons of spray, might be tried. These aphids must be overcome before the buds open and make cover for them to shelter from the spray.

Woolly Aphis.—In many orchards the parasite, Aphelinus mali, keeps woolly aphis in check sufficiently without any treatment by the orchardist, but there are some orchards where, on certain occasions, some treatment is advisable. It sometimes occurs during the latter part of the winter that woolly aphis makes headway, and so that it will not get too much of a lead on in the spring or early part of the summer before the Aphelinus mali is very active, it is advisable to spray aphis-liable apple trees with some aphicide such as tobacco wash or nicotine sulphate before the trees make much leaf in the spring. From tests and observations made by the Entomological Branch it has been found that spraying during the dormant period does little or no harm to the parasite.

Black Spot of Apple and Pear.—Some of the earlier-starting apples and pears will be ready for the first or "spur-burst" application of fungicide for the control of black spot in September; others will not be ready till early October. In some localities this disease does not occur, or the outbreak is so rare that it is not necessary to use control measures. Where apple and pear trees are liable to this disease it is not safe to omit the initial sprays, that is the "spur-burst," "pinking" and "calyx" or "petalfall" period applications. Whether later applications are necessary will depend on weather conditions.

Bordeaux mixture is the best fungicide for the control of this disease, but unfortunately if applied later than spur-burst period it is liable to cause considerable injury by russetting the fruit, and for this reason the Department recommends Bordeaux mixture (6-4-40) applied at an early spur-burst period, lime-sulphur diluted to spur-burst strength (see column

B, page 6, Lime-sulphur leaflet) at pinking period, and lime-sulphur (summer strength for apples and pears—see column D, page 6, Lime-sulphur leaflet) at onlyx period and at later periods if necessary.

Concentrated lime-sulphurs are of various strengths, and consequently without knowing the strength of the concentrated solution, it is not possible to give the exact dilution; but this is shown for various strengths of concentrated lime-sulphurs in a table on page 6 of the Lime-sulphur leaflet obtainable from the Department. Leaflets on making Bordeaux mixture, control of black spot of apple and pear, and the mildew of apple are also obtainable.

Rust and Shot Hole of Stone Fruits.—Where stone fruits have been subject to this disease, they should be sprayed with Bordeaux mixture (6-4-22) before the buds burst in the spring.

## Combined Bordeaux and Oil Spray for the Control of Verrucosis (Scab) and Red Scale.

When two pests or diseases are present which require to be sprayed at the same period, it is a great economy if a spray or a combination of two sprays can be used in one application which will deal with both diseases or pests. Some sprays cannot be mixed, as a reaction occurs which may render them harmful to the tree or ineffective.

Mr. W. B. Stokes, Fruit Inspector, Gosford, has supplied the following notes on oil and Bordeaux mixture combined. Experiments in this combination are not yet concluded, but some growers may wish to try this combination out in a small way.

An experimental combined spray of Bordeaux (3-2-40) plus 2½ per cent. of a proprietary spraying oil was applied to lemon trees at Springfield in the Gosford district during the first week in May of this year. The Bordeaux was made up to approximately 36 gallons before adding the oil. One gallon of the oil was diluted with 1 gallon of water and mixed until free from lumps or curds. The diluted oil was then poured slowly into the Bordeaux mixture, which was agitated thoroughly during the process, water then being added to bring the mixture up to 40 gallons. The trees, which promised a good bloom, unfortunately opened only a few buds at any one period, and the control of scab by this mixture could not be checked up, but the kill of red scale was quite satisfactory. No actual count was made, but the kill was equally as high as in a check plot alongside sprayed with the oil alone at 1 in 40, and on other trees on the same orchard sprayed with other brands of oil.

A Burgundy mixture with extra soda was tried in the Gosford district for the control of scab and white wax scale. The season was late when the application was made, but there is promise that this spray will control both these troubles if applied early in the season.

#### Black Spot and Codling Moth.

The following observations are made by Mr. W. W. Cooke, Orchard Instructor, Goulburn, on the varying results obtained by fruit-growers in the control of certain pests and diseases, and he suggests why these variations occur.

Growers in some districts have obtained good results in the control of black spot of apple and pear by adopting the recommendations given earlier, yet the loss from this disease has been considerable in southern New South Wales. It has been noticeable that whilst the fruit in one orchard is reasonably free from spot, the loss in an adjacent orchard may be very great. This loss can be attributed in almost every case to one or other of the following reasons:—

- (a) Failure to spray at all, or insufficient applications.
- (b) The application of the spray mixtures at the wrong period, often too late to be of much good, the fruit having become badly spotted before the spray was applied.
- (c) Too weak an application, or the wrong mixture applied.

Much the same may be said regarding the control of codling moth, some orchards having been remarkably free, whilst others have experienced as much as 50 per cent. loss. The brand of arsenate of lead used is often blamed, the owner of one orchard declaring that the lead used by him was at fault, and that he proposes using a different brand next season. This applies to almost every brand of lead on the market, and, strange to say, brands that have been heartily condemned by one grower have given excellent result in other orchards. It would thus appear that there are other factors to be considered and amongst these may be mentioned thoroughness of application; every part of the fruit should be wet with a fine misty spray. The number of applications is also a matter of importance. This year eggs were laid on the fruit much later than usual—as late as the second week in March in some orchards-and additional sprays were therefore necessary. The strength of the spray mixture is of importance, some growers being inclined to "save" expense in this direction. Care should be taken that the strength of the lead arsenate mixture should at least not be under that required by the regulations.

Then there is the matter of orchard sanitation. In some cases too much reliance is placed on spraying alone, and sufficient care is not exercised to prevent the escape of codling moth larvae. As many as thirty grubs have been found in one broken limb, and more in the decayed wound caused by the removal of a large limb. Such "danger spots" should receive careful attention in the winter or early spring, broken limbs being removed and decayed or other wounds being cleaned out and treated with Stockholm tar or paint. The necessity of removing loose bark if the bandages are to be of much use is obvious.

There is great danger of leaving codling moth infested fruit lying about either in the orchard or in the fruit sheds. All infested fruit should in promptly dealt with before the codling grub escapes from it, verhaps to turn into a moth eventually and lay numerous eggs.

As many growers are able each year to keep codling moth in control- some stating their loss is not 1 per cent. -it would appear that if the following methods of control are carried out carefully no great loss should be experienced:---

- 1. Careful spraying at the right times and with a spray of sufficient strength, additional sprays being given if the season requires it.
- 2. Removal of all loose bark, broken limbs and other places where grains can harbour.
- 3. Frequent picking up from the ground and off the trees and prompt destruction of all infested fruit.
- 4. Careful attention to the bandages between the months of November and March and their final removal in June, killing all grubs found.

#### Drainage.

The coastal fruit areas experienced incessant rains during June, and in many localities areas that require underground draining will probably show up. Generally those who purchase sites for orchards choose land which is naturally well drained, but even then there are often some areas which drainage would greatly improve. A better knowledge of the benefits of good drainage would lead growers to undertake the drainage of some, if not all, of their orchard lands. Effective drainage results in improved conditions in respect to soil, air, and water, with resultant benefits to the vegetation involved. Drainage, therefore, if properly carried out, improves the potential productivity of the soil and enhances the value of the affected land.

#### BUILD UP AN EXPORT TRADE IN MUTTON, LAMB AND BEEF.

"I would like to impress upon the producers of Australia that in my opinion there is no country in the world in which beef, mutton and lamb can be more economically produced than in Australia; and in view of the declining prices of wool and the economic necessity for greater export of mutton and lamb and other primary products to assist in maintaining and increasing our trade in the markets of Great Britain, I would urge that we take this matter up seriously, and by a thorough organisation of production, treatment, transport and marketing, show the world that we are in a position to produce the high-quality article the markets of the world demand and successfully meet the competition of all the other meat-producing countries, and thereby establish ourselves as a strong factor in the world's supply of meat products." -JNO. B. CRAMSIE, Chairman of the Metropolitan Meat Industry Board, at the Molong Agricultural Bureau Conference, 1930.

#### EXPERIMENTS FOR CONTROL OF BLACK SPOT OF APPLE.

Straying experiments for the control of black spot in apples have been conducted for five consecutive seasons in the Penrose and Batlow districts by the Department of Agriculture in co-operation with Messrs. Rose Bros. and Mr. Buchele, respectively. A complete account of the tests will be published at an early date, when the usual acknowledgments will be made.

At Penrose the best control of the series was obtained by applying Bordeaux mixture (6-4-50) at spur-burst and lime-sulphur (1-35, 26 deg. B.) at the calyx stage. Pinking stage sprays were omitted. The percentage of clean fruit in this series was 78.84, with an average of 24.91 per cent. of clean fruit on the unsprayed trees.

Much better results were obtained at Batlow by use of the following spray programme:—

Bordeaux mixture (6-4-40) at spur-burst stage. Lime-sulphur (1-14, 26 deg. B,) at pink stage. Lime-sulphur (1-35, 26 deg. B.) at calyx stage.

This treatment gave 98.49 per cent. of clean fruit, whereas only 39.02 per cent. of clean fruit was produced on the unsprayed trees. The programme is strongly recommended for the control of black spot in districts liable to infection.—W. A. Birmingham, Assistant Biologist.

#### "HEREDITY IN LIVE STOCK."

This little book (179 pages, well illustrated) gives a very simple and readable explanation of the Mendelian law of heredity as applied to the breeding of livestock. Such chapter headings as "Heredity Factors Determining Milk Production," "Heredity Factors Influencing the Butter-fat Content of Milk," "In-breeding of Cattle," "In-breeding of Horses," "In-breeding of Pigs, Sheep, and Poultry," "Valuation of Pedigree," &c., give some idea of the contents of the book.

For the author, the late Christian Wriedt, it has been claimed that he was as fully conversant with the breeder's problems as he was versed in the scientific principles underlying them.

Our copy from Messrs, Macmillan and Co. Ltd., London.

#### NEW BOOKS RECEIVED FROM PUBLISHERS.

A Text-book of Tropical Agriculture (2nd edit. 1929), by Sir Henry A. Nichols, revised by J. H. Holland. Publishers: Macmillan & Co. Ltd., London.

Plant Discases, by F. T. Brooks. Publishers: Oxford University Press, London.

Angora Wool Rabbits for Profit in Australia and New Zealand, by Arthur Sainsbury. Published by the author.

Australian Rain-forest Trees, by W. D. Francis. Printed for the Commonwealth Government by the Government Printer, Brisbane. Our copy from the Council for Scientific and Industrial Research, Melbourne.

## Poultry Notes.

#### AUGUST.

#### V. H. BRANN, Acting Poultry Expert.

The one bright side of the present position with regard to the prospective return from the flocks this year is the cheaper prices ruling for the principal foodstuffs in comparison with the same period last year. The average net price of eggs last year was 1s. 6d. per dozen, the lowest since the year 1925-26. Against this the cost of feeding was 9s. 10d. per hen, the highest since 1928. Estimated on a twelve dozen average per hen, the net return per bird was, therefore, 8s. 2d.

That the poultry industry has developed in spite of even worse periods than the present is shown by the following table, which gives the cost of feeding and net return per hen since 1903:—

TABLE showing Net Return per Hen, 1903-1930.

	7	Year		1	Cost of Feeding	Average Net Price of Eggs	Total Value of Production	Net Return Per Ik n over Cost of Feed.
-	-			1			1	l
				1	s. d.	۶. d.	£ s. d.	8. đ.
1903-4					5 94	1 34	0 15 9	9 114
1904-5	•••		•••		4 51	1 0	0 12 0	7 61
1905-6	•••			•••	$\begin{array}{cccc} 4 & 5\frac{1}{3} \\ 5 & 3\frac{1}{3} \end{array}$	0 111	0 11 6	6 2
1906-7	***	•••		•••	5 10	1 01	0 12 6	ัง ลั <sup>ร</sup> ์
1907-8	•••			•••	7 0	1 31	0 14 6	7 8
1908-9	•••		•••	•••	7 94	1 21	0.15.3	7 51
1909-10		•••	***	***	6 9	1 51	0 17 3	10 6
1910-11	•••	•••	•••	***		1 2	0 11 0	7 61
1911-12	•••	•••	•••	•••	6 5 <del>1</del> 6 1 <u>1</u>	1 24	0 11 6	8 41
1912-13	•••	***	•••		7 3	1 34	0 15 6	9 21
1913-14	•••	•••	•••	•••	5 9	1 23	0 11 6	8 9
1914-15	•••			•••	6 94	1 2	0 11 0	7 21
1915-16	***	•••	• • •	***	7 7	1 11	0 16 6	8 11"
1916-17	•••	•••			6 10	1 37	0 15 9	8 11
1917-18		•••		• • •	7 8	14	0 16 0	8 4
1918-19		***		***1	7 10	1 54	0 17 6	9 8
1919-20		***	***	***	9 3	1 10	120	12 9
1920-21	•••	***	***	***	12 8	2 2	1 6 0	13 4
1921-22	***	•••			11 9	1 11	130	ii s
1922-23	•••	***	***		10 10	1 9	1 1 0	10 2
1923-24		***	***		9 9	1 6	0 18 0	8 3
1924-25	***	***			9 11	1.8	100	10 1
1925-26	***	•••	***		10 0	1 6	0 18 0	8 0
1926-27	***	***	***	***.	11 0	1 81	108	9 6
1927-28	***	***	***		9 7	1 10"	1 2 0	12 5
1928-29	***	***	***		8 7	1 91	1 1 6	î2 1î
1929-30			***		9 10	1 6	0 18 Ö	8 2

Early Hatched Chicks.

Hatching operations should now be in full swing, and by the end of this month the greater portion of the chicks it is desired to rear this season should have been hatched. It is apparent that more early chicks are being

raised this season than in former years. Provided the brooders are not overcrowded, the idea is a good one, as better development is obtained from this stock, and, moreover, the cockerels are worthy of good treatment, as remunerative prices are usually obtained for them before Christmas.

White Leghorns should comprise the greater number of the chicks hatched in September. The impression that early-hatched Leghorns are not good layers is a wrong one; and, although it must be expected that they will fall into moult in the following autumn, they will be the best breedersto produce early chicks the following season. The return from eggs produced from January till March by this class of stock is also a compensating factor to be considered. It is not desired, however, to create an impression that September-hatched chicks are not worth rearing. Leghorns, especially, can be regarded as being more reliable layers during April and May than the early-hatched chicks. It is where the majority of stock are hatched during September under crowded systems of rearing that troubles are experienced right from the commencement. Also, little profit can be expected from the cockerels, as there is always a glut when they are ready for the market.

#### The Hover Brooder.

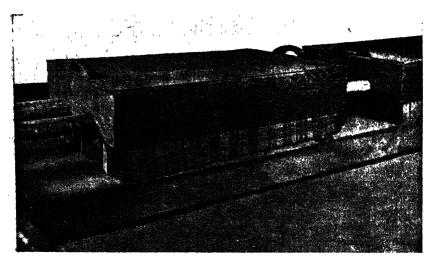
The hovers on the hot-water circulating system are becoming increasingly popular on many farms. This system, together with the box type, has been in use at the Government Poultry Farm, Seven Hills, for a number of years, with very satisfactory results. Its one advantage over the box type is the cheaper cost of construction. The hovers can be made easily and cheaply on the farm. There is one point to remember, however, and it is that the pipes are more exposed than is the case with the box type, but where there is difficulty in maintaining the required heat it will be found to be due to any or some of the following reasons:—

- (1) Faulty installation of pipes—where the boiler is not sunk below the floor, the pipes are not level, or water has to circulate too far, *i.e.*, more than 50 feet.
- (2) Bad stoking of the boiler.
- (3) Too airy conditions in the brooder house, or house too low.
- (4) Hovers are too wide, or ventilation is allowed through the top of the hover, thus allowing the heat to escape too quickly.
- (5) Curtains are worn out or made of material that twists, or are not allowed to come down near to floor level.

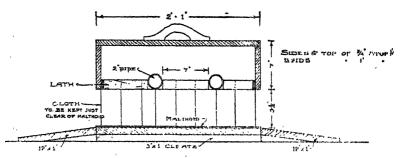
Ventilation is very necessary for chickens, but the amount is dependent upon the chicks being given sufficient heat. The minimum heat required by day-old chicks is 90 deg. Fahr.

The hover illustrated is 25 inches wide and 7 inches deep. The length will depend upon the number of chicks; one of 100-chicks capacity is 3 feet 6 inches long. It is made of wood 3-inch thick, which is preferred to iron, because the latter is difficult to keep at an even temperature during changeable weather conditions.

The floor underneath the hovers should preferably be of wood covered with some kind of composition roofing material, which should be 51 inches clear of the bottom of the pipes. A sloping ramp (12 inches wide) from the ledge caused by the wooden floor underneath the hovers is necessary. This ramp enables the chicks to get back easily if forced out during the night. A barrier of wood 12 inches high, or of netting covered with hessian, is required to prevent the chicks from straying too far from the brooder during the first week.



An Illustration of the Hover Described.



Cross Section of the Hover.

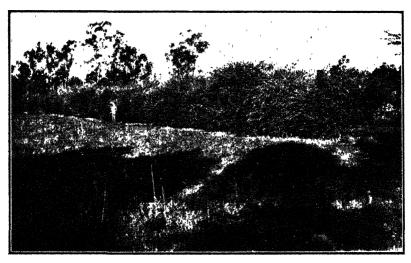
The curtains are made of check Kersey or some other heavy woollen material, slutted every 21 inches and hung right around the hover just clear of the floor.

Plans of both hover and box type of brooders, also of the hot-water circulating system, are available on loan from the Department of Agriculture.

#### Stoking the Stove.

If the stove is properly stoked at 10 o'clock each night there is absolutely no necessity for further attention till the morning. Where trouble is experienced in this direction it is due to faulty stoking, improper adjustment of the damper, or to the flue being burnt out or requiring cleaning.

As already pointed out, if the pipes are wrongly installed more fire will be required to maintain the heat, due to sluggish circulation, and hence more frequent stokings will be necessary. The stoves have been used on all the Department's farms for many years and in no instance has it been necessary to stoke during the night. Throughout last season the only coke obtainable was of a very inferior quality, but by careful stoking, even under these circumstances, no trouble at all was experienced.



A Tree Lucerne Hedge.

The coke used should not be larger than approximately 2 inches and should be quite free from any dirt or coke dust. All ashes and rubbish must be thoroughly cleaned from the fire bars. When the fire has burnt low a small quantity of coke should be put on first and the damper drawn out to enable it to burn up brightly. When this has been done the stove may then be filled up and the damper adjusted for the night. The adjustment of the damper is very important and is usually left open about 12 inches, while the plate covering the ashpit might be left open from ½ to 1 inch. In this connection much has to be left to the judgment of the stoker, as a narrower opening will be required on a windy night than on a cold or very still, frosty night.

#### The Planting of Shade Trees.

The present is the right time to plant shade trees and windbreaks if such are desired.

In exposed positions a good windbreak on the southern and western sides of the farm is a big advantage. On the western side trees should not be allowed to grow more than 20 feet high, nor should they be in close proximity to any of the buildings, as in the winter months they are responsible for too much shade, with consequent cold conditions during the greater part of the afternoon.

Trees in the yards are not a safeguard against losses during heat waves. Where too much scrub is growing it prevents circulation of air, and even increases the intensity of the heat when it is very oppressive. To keep the birds confined in their proper enclosures, trees should not be planted within 25 feet of the fences or buildings, and hence it is inadvisable to plant them in small yards. Nevertheless a few good shade trees in the larger yards are ornamental and add to the comfort of the flocks during normally warm weather.

The best types of trees for yards are those which are deciduous, hardy. quick-growing, and thernless. A smooth bark is also preferable, so as not to provide harbour for parasites. A very satisfactory tree is the White cedar (Melia azedarach). Coral trees are also satisfactory, but only do well in coastal districts.

For windbreaks Sugar gums (Eucalyptus cladocalyx) are recommended and should be planted 15 feet apart. They require lopping from time to time. A hedge of Tree lucerne (Cytissus prolifera) planted 10 feet apart also provides good protection from winds, and is very suitable for the western side of the farm.

#### Grass: The Mainstay of Agricultural Prosperity.

I THINK it may be fairly claimed that the pivotal crop on which the world's agricultural properity depends is without a doubt the herbaceous sward, and at long last it is beginning to be realised that the character and moneyearning ability of this sward are more amenable to control by scientific management than perhaps any other crop with which the farmer is concerned .- Prof. R. G. STAPLEDON, Director of the Welsh Plant Breeding Station, Aberystwyth, Wales.

#### PRAISE FOR THE WHEAT GROWER.

Addressing a recent gathering of farmers in the north-west. Mr. E. S. Clayton, Senior Experimentalist of the Department, said that in the matter of self-help the wheat-growers had set an example to the rest of Australia, and this was a factor tending towards improvement in every wheat-growing district. Australian wheat growing had had its ups and downs, but it could be said that wheat was grown in Australia successfully on a lower rainfall and with higher temperatures than anywhere else in the world, and this was largely the result of the farmer's own initiative in devising and trying out new methods.

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1st September, 1930.

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## **Another Enthusiastic** LEYLAND Owner:

"Far in advance of any other lorry on the road to-day"

Ararut, Victoria. 1st August, 1930.

LEYLAND MOTORS LIMITED.

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> Yours faithfully, (Scp.) W. BELL & SON. per G. Bell..





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Agricultural Gazette of New South Wales.

## A Review of Plants Poisonous to Live Stock.

H. R. SEDDON, D V.Sc., Director of Veterinary Research \*

The influence of poisonous and otherwise harmful plants on the health of live stock is, in Australia, a matter of considerable moment to the stock-owners, and furnishes a good example of a subject which is of considerable interest to workers in more than one science. It has seemed to me, therefore, that at a meeting such as this, where we have all branches of science represented, one need offer no excuse for bringing forward such a subject.

We can consider poisonous plants from several points of view; we can deal with them according to their botanical relationship, according to the chemical constitution of their toxic principles, or according to the effects manifested by them on animals. Being a veterinarian I shall naturally consider them from the last-mentioned point of view. And here let me state that I use the general term "poison plant" to include not only plants which are acutely poisonous, but those which in any way disturb the health of stock. Some plants are simply harmful in a mechanical fashion, but as they may, and do, exert considerable influence on the health of an animal, they may well be included in this paper, though, of course, they are not, strictly speaking, poisonous.

The material at one's disposal for such a paper is immense, and our lack of exact knowledge regarding many plants is indeed considerable. Nevertheless, it seems to me that it is a good thing, now and again, to endeavour to review such a problem in a general fashion.

Papers presented to this Association in the past have been mainly considerations of the botanical, chemical, pharmacological, or veterinary aspects of a single, or, at most, a small group of poisonous plants. Many contributions have been made to this Association, to other learned societies in Australia, and to various scientific publications, and to those writers who have recorded their observations I feel under a considerable debt, for vast indeed is the information that has been collected and published.

#### Determination of the Poisonous Nature of a Plant.

Valuable though reports of harmful action assumed to be due to some plant may be, and however strong the circumstantial evidence, we must subject every suspected plant to one of two tests before we are at liberty to convict it of being actually poisonous. These two tests are:—(1) The determination, by feeding the plant to an animal of the species reputed to

<sup>\*</sup>An abridgment of Dr. Seddon's presidential address to Section L (Vetermary Science) of the Australasian Association for the Advancement of Science, at the Congress held in Brisbane, May, 1930.

be poisoned by it, that the plant is actually poisonous; or (2) the determination by chemical analysis that, in a quantity of the plant that an animal might consume, there is present some identifiable chemical substance insuch quantity that it would have poisonous effects.

As the most rapid, and certain, method of determining the poisonon-property of a plant, a feeding test is to be undertaken in all cases, I think, before one assumes definitely that a plant is poisonous. Negative feeding tests do not necessarily imply that a plant is harmless; they are evidence only that that particular plant, drawn from that locality, at that particular stage of growth, collected at that season, and tested according to a certain method of administration, is not poisonous so far as the species of animal tested upon, that animal being kept in that particular environment. If a number of similar tests are undertaken, with plants from various sources, collected at various seasons, upon animals of different breeds and colours, kept under different environments, and these are all negative, then it is very probable, but not necessarily conclusive, that the plant is harmless.

The fact that many animals are known to graze commonly and with impunity upon a plant does not necessarily mean that that plant is never poisonous.

#### Factors which Influence Variation in Toxicity of a Plant.

Locality.—It is a well-known fact, particularly in the case of certain plants used medicinally, that a plant drawn from a certain locality, State or country, may be toxic, whereas what is botanically the same plant, drawn from another place, is non-toxic. The influences that are concerned here are soil, climate, and altitude. In Australia we have certain examples of this in the case of plants poisonous to live stock. Thus, Whitewood (Atalaga hemiglauca) has been found by Murnane and Ewart to be poisonous for horses in Western Australia, and on clinical grounds has been assumed to be harmful in western and northern Australia; yet in New South Wales and southern Queensland the tree appears to be harmless. Our feeding tests with New South Wales material have so far been negative, and White states that though suspected in northern and central Queensland, this tree is not suspected in the southern part of that State, though it is abundant there. Milkweed (Euphorbia Drummondii) drawn from certain localities has been found by us to be toxic; from other localities, not.

Season.—We have had reported to us that during certain seasons some strongly suspected, sometimes actually poisonous, plants are responsible for serious losses. At other seasons, may be other years, they are not. Possibly the actual season of the year is not the deciding factor in all these cases; it may be the influence of certain factors associated with season and climate, e.g., cold (frost) or rainfall. Most intriguing in this respect is Variegated thistle (Silybum mariana), which is highly toxic at times and at other times harmless.

Stage of Growth.—From analogy with plants which are used medicinally, we expect that certain, if not most, of our poisonous plants may be more harmful at some particular stage of growth. It would appear that in

some cases the toxic principle is present in greater amount in the tissues of the young growing plant; in others, in the seed. We already know that Rough-bearded grass (Echinopogon ovatus) is dangerous only in the earlier stages of growth, i.e., before it seeds; Darling Pea (Swainsona procumbens)—proved by feeding tests to cause "Pea Struck"—is believed to be most harmful when in bud. In the case of Stagger weed (Stachys arvensis) we find the active principle in much greater concentration in the seed than in the tissues of the fresh growing plant, and possibly the active principle is confined to the seeds.

Method of Administration.—Practically all our poisonous plants are taken into the alimentary tract by stock, and in testing the toxicity on an animal the test should be by feeding.

Species of Animal.—Reference has already been made to the fact that a plant may be toxic for small animals, such as rabbits and guinea-pigs, and yet harmless for sheep. It should be tested upon domesticated animals of those species which are commonly in a position to be poisoned by it.

Environment of Animal.—The important points under this heading are (a) exposure to sunlight, and (b) exercise.

Exposure to sunlight is necessary to bring out the photosensitising properties of trefoil (*Medicago denticulata*) and St. John's Wort (*Hypericum perforatum*). Animals kept in dark stables will not show symptoms, and we have found that even those kept outside but tested in cloudy weather (overcast skies) will not show photosensitisation unless they have had a considerable amount of the plant.

Exercise is necessary to bring about the symptoms of the shivers-producing group of plants, Marshmallow (Malva parviflora), Dead Nettle (Lamium amplexicaule), Stagger weed (Stachys arvensis), and Rock fern (Cheilanthes tenuifolia). These characteristic symptoms of shivers (and staggers) are not seen in animals closely penned, even in those running at pasture, though, possibly owing to another toxic principle in the plant, such animals may suffer illness and die.

Breed and Golour of Animal.—Colour is of importance in connection with plants harmful by reason of photosensitising properties, it being only animals with unpigmented skins, or, in the case of animals with particular coloured skins, only the unpigmented portion which is involved.

#### Importance of Exact Botanical Determination.

Vernacular names vary considerably, and a common name for a particular plant in one locality may be applied to an entirely different plant in another locality. Experience has also taught us that what at one time we believed to be the same species, may, on further investigation, prove to be different botanically. In all cases, therefore, specimens of plants used in feeding tests, and, in fact, all plants considered in connection with poisoning of stock, should be submitted to a recognised botanist.

Whilst it is well known that the members of certain genera, even of certain families, are commonly, perhaps all, poisonous, such relationship cannot be held to indicate toxicity. Conversely, certain families were at one time believed not to include any poisonous plants, but later work has shown that such families may include a poisonous plant.

#### The Effects of Plants Poisonous or Otherwise Harmful to Animals.

Plants which by their Toxic Action Directly Bring About Death. What the actual losses from highly poisonous plants may have been in the past in the State of New South Wales it is impossible to say, and though, thanks to recognition of the poisonous properties of certain plants, these losses are now much less, quite serious losses do still occur.

The most serious mortalities which have occurred from time to time are probably those due to plants which are responsible for prussic (hydrocyanic) acid poisoning, and there is little doubt but that a very large proportion of deaths during the latter part of last century attributed to anthrax, were, in point of fact, due to cyanogenetic plants. Those who have had to deal with stock, even in more recent years, can recall instances where a large number of cattle, or a hundred or more sheep, more especially travelling stock, have been suddenly stricken with illness and have died, the whole mortality ocurring within twenty-four or forty-eight hours. The plants most commonly responsible have been Blue Couch (Cynodon incompletus). Milkweed (Euphorbia Drummondii), and Variegated thistle (Silybum mariana). The last-mentioned, it may be pointed out, produces losses under much the same circumstances as cyanogenetic plants, but, though it is suspected of being cyanogenetic, the fact has never been demonstrated chemically.

There are, however, many other plants which are cynnogenetic, many of them capable of causing death, and among them may be mentioned Rosewood (Heterodendron oleacfolia), River Myall or Sally Wattle (Acacia glaucescens), Curracabah (Acacia Cheelii), Currawang (Acacia doratory lon), Wild Indigo (Indigofera australis) of the coastal areas, Native Bird's foot trefoil (Lotus australis), Native Fuschia (Eremophila maculata), &c. These are mostly native to Australia. Some are small plants, others are shrubs, and others again are trees. With so much herbage feeding in Australia it is no wonder that stock at times gather them readily. In times of drought many trees are lopped to provide fodder for the stock, and thus during certain seasons plants not usually available are eaten by stock.

Three remarkable features are in evidence with regard to the cyanogenetic plants and trees, viz., (a) that the poisonous properties vary, and so a plant may at times be poisonous and at other times not; (b) that many excellent fodders may be cyanogenetic though never harmful; and (c) that there is a distinct difference in susceptibility between pastured and travelling stock.

Some of these cyanogenetic plants occur extremely commonly (notably Milkweed and Variegated thistle), growing, even in profusion, over wide-

tracts of country, and yet stock depastured thereon suffer no ill-effects. Other stock, however, such as hungry travelling or detrucked animals, coming suddenly upon a patch of these weeds and devouring the plants greedily, may be poisoned. Sorghum, planted commonly as a cattle fodder, is strongly cyanogenetic and sorghum-Sudan grass hydrids even more so.

With certain of these plants which directly cause death, mortality is not so sudden as with the cyanogenetic plants, and death of the animal occurs in from one or two days to a week or more after partaking of the plant. Examples of this group (of which the active principle is not known) are Sturt's Nightshade (Solanum Sturtianum), Narrawa Burr (Solanum cinereum), seeds of Burrawang (Macrozamiu spiralis and M. Perowskiana). White Cedar (Melia azedarach), Petty Spurge (Euphorbia peplus), Red-Yellow-flowered lantana (Lantana crocea). The active principles of Castor Oil plant (Ricinus communis), Hemlock (Conium maculatum), and cominon Oleander (Nerium oleander) are known, and are ricin, conine and a glucoside, respectively.

Plants causing Disablement with Death from Misadventure.—A not uncommon sequel to the effects of some plants is death from misadventure. Thus, Rough-bearded grass (Echinopogon ovatus) produces a peculiar form of "staggers" or "wobbles," the animals showing a peculiar stilted or staggery gait, which, on excitement, increases to a complete inco-ordination of the muscles of locomotion. When one remembers also that another effect of the plant is to produce a hyper-excitability, it is no wonder that when such animals are startled by such happenings as the sudden appearance of a dog, or even of a man, they rush away, only to fall down unable to rise until the excitement wears off. Thus, they frequently fall into holes, collide with fallen trees and get into similar awkward, if not dangerous, situations. Similarly, death from misadventure is the lot of many animals poisoned by certain Darling peas (Swainsona spp.).

A very peculiar disorder is what is termed "Western Blindness" in horses. There is strong clinical evidence that this is brought about by eating the melons of Chinese or Paddy Melon (Cucumis myriocarpus), though up to the present it has not been possible to produce a case experimentally. The disease is confined to areas where the melons grow in abundance, namely, in the western district and a portion of the Central Tablelands (Merriwa) of New South Wales. Natural cases are invariably in animals that have had access to the melons in quantity, and the disorder is marked by a progressive blindness which is accompanied by deafness. There is no change visible in the eye, and the health of the animal remains good. The disease is therefore never fatal of itself, though such animals may die from accidental causes.

Plants Leading to a Disability Preventing Maintenance of Body Functions.—There are plants which, whilst they produce serious disabilities, do not render the animal liable to death from misadventure, but lead to conditions which so interfere with certain normal functions that the animal cannot undertake certain actions that a normal animal should, and therefore seriously impair the usefulness of the animal. One may here refer to stringhalt in horses. The cause of this is not definitely known, but there is strong clinical evidence that it is associated with eating False Dandelion or Flat-weed (Hypochaeris radicala).

Plants which Lead to the Development of Abnormal Appetites (Cravings).—Animals may develop a craving for certain of the plants mentioned above, notably for Darling peas (Swainsona spp.) and Paddy Melon (Cucumis myriocarpus), but, in addition, cattle may exhibit a craving for the leaves of Burrawang (Macrozamia sp.) and of Grass Tree (Nanthornhorn spp.). These latter are both very innutritious, and consequently animals suffer serious loss of condition and diminution in milk yield. They may, in addition, however, be affected with certain locomotory disturbances which are probably due to some toxic action from the plant. Animals which have a craving for some particular plant will walk miles to get it, and the result of this and their neglect of nutritious fodder plants, is serious loss of bodily condition.

Plants which Cause Disorders Serious in their Effects, but not Necessarily Fatal.—The eating of these plants leads to the skin (when unpigmented) becoming so sensitised to the action of the sun's rays that on exposure of the animals to sunlight a severe form of dermatitis is brought about. The two plants most commonly responsible for this are Burr Medic or trefoil (Medicago denticulata) and St. John's Wort (Hypericum perforatum). The former is a valuable fodder plant, the latter a noxious weed. St. John's Wort (Hypericum) is more powerful in its action, and an animal so sensitised will rub, bite and scratch areas of unpigmented skin until they become quite raw. These areas may become septic and the animal die, or, if the muzzle is affected the skin of the muzzle may become necrotic and slough off. On removal from the plant the animal loses this sensitised state, and so one frequently finds that after some days' agony animals commence to recover. The ears, however, are frequently withered right up.

Burr Medic or trefoil (Medicago denticulata) induces symptoms which are similar, but not so intense. Sheep, cattle, and horses commonly graze on the plant, which forms a large bulk of the pasturage in north-western and western areas during late winter. Again, only unpigmented skin is susceptible, and therefore the parts most commonly affected are white areas in cattle, white markings on the face and feet of horses and the face and ears of sheep. Sheep in the wool may suffer along the back, but more usually one finds the wool-covered parts are involved only in recently-shorn sheep. Redness and oedema are the initial lesions, but these are followed by necrosis (death) of the skin, the part becoming leathery and dry. Recovery follows sloughing off of the necrotic skin. The condition is a very painful one, and animals lose weight, partly from the discomfort and partly from failure to graze owing to the immobility of the lips.

Our more recent investigations would indicate that there is certainly another, quite probably more than one, plant capable of inducing this condition of photosensitisation. One refers here particularly to a condition which we have termed "Yellow Bighead." The disease is essentially a summer complaint, occurring from October to March, and in all cases has occurred when there has been a period of warm, humid weather following rain. The vegetation in these cases has been young and for the most part immature and succulent. The disease has been reproduced by McGrath (of the Glenfield Veterinary Research Station) in sheep penned on small areas of a paddock wherein natural cases of the disease occurred, and suspicion centres very strongly on a particular type of Summer grass (Panicum effusum).

Plants Causing Digestive and Other Disturbances which may allow of Super-imposition of Other Maladies.—The best example one can quote here, and a very good example, is the effect of Bracken fern (Pteridium aquilinum). The continued ingestion of this in moderate quantities leads to gastro-enteritis of an acute ulcerative type, but animals die of a septicaemia due to a specific coliform organism which, it would seem, gains entrance through the lesions in the alimentary tract.

Plants which Lead to Deficiency Diseases.—We must, however, remember that a plant may be harmful not only from the presence of some harmful (toxic) substance, but from the absence of some constituent essential for the health and well-being of the animal. This has been shown in important studies that have been made upon the subject of nutrition. Thus, cattle fed entirely on the wheat plant (wheat straw, wheat gluten, and wheat grain) became unthrifty in appearance and produced only weak, undersized calves which were born prematurely and were often dead. Cattle fed entirely on the corn plant, on the other hand, remain quite healthy and produce healthy young. When we remember that at times in Australia an animal may have to subsist on some particular plant or group of plants for several weeks without change in diet, one may well expect that a disorder resulting may be due to some deficiency in the diet. Particularly would this operate in the case of animals—(a) which have acquired a craving for some particular plant; (b) which are fed upon some particular fodder during time of drought; or (c) which are depastured upon some particular crop for a lengthy period.

We know also that fodders grown upon certain soils may be very seriously deficient in phosphorus and so lead to ill-health. Deficiency of phosphorus in the fodder leads to a condition, unfortunately present over larger areas than is generally recognised, in which the less severely affected animals show bone-chewing, general unthriftiness and lack of proper bone growth; severely affected animals show, however, the condition commonly termed "cripples" (osteomalacia). Even the apparently harmless symptom of bone-chewing (brought about by phosphorus-deficient fodder) may be attended with serious results, for animals which chew bones are prone to pick up bones in which there may be a bacterial toxin, and so die of what we term carrion poisoning.

### CONSERVING FODDER ON THE FAR SOUTH COAST.

MR. JOHN L. GREEN, Agricultural Instructor on the Far South Coast, reporting on the past senson's fodder conservation competitions in his district, draws attention to the outstanding increases not only in the number of societies which conducted competitions, but also in the number of individual competitors. As evidence of the improved standard of the entries, he points out that first, second and third places in the championship competition all went to Far South Coast farmers. For report of the championship competition see page 645 of this issue.

One of the most pleasing features of the competitions was to find nerry every entrant with a quantity of lucerne hay. One farmer on the comparatively poor hills at Bemboka has 45 acres sown to lucerne and intends to sow more. When it became more fully realised that lucerne could, and was, being grown on hill land on the Far South Coast, stated Mr. Green, considerable areas would be established.

Fodders were conserved in all forms, maize silage, oaten and lucerne hay, and maize grain predominating. Most of the silage was satisfactorily stored in overhead concrete silos, but, except in a few cases, the reserves of hay were not well stored. Hay stored in an old room or barn was difficult to get at and there was considerable risk of fire. Frequently the old room or barn could be pulled down and the materials used to build a bigger and more convenient hay shed. Again, the erection of rat-proof maize cribs, most of the materials for which were to be found on the farm, was something to be desired on some of the farms judged by Mr. Green. A large quantity of stored fodder was not the only consideration. Competitors should keep in mind the other points on which the entries were judged, such as location, protection, &c.

These competitions serve a very useful purpose in demonstrating the methods employed by those progressive farmers who put into practice the oft-repeated advice to farm for a drought. Probably no other primary product fluctuates so much as that from a dairy farm, and generally the cause of this fluctuation is to be found in the seasonal conditions. The carrying out of a sound policy of fodder conservation will result in higher and more uniform production.

### ALTERATION OF THE TITLE OF GLEN INNES EXPERIMENT FARM.

In future Glen Innes Experiment Farm will be known as New England Experiment Farm, and the address will be Glen Innes, as previously.

### A NEW LIST OF PUBLICATIONS.

READERS will be interested to learn that a revised list of the Department's publications has just been issued. This list contains the titles of over four hundred leaflets, bulletins and books on practical farming subjects, and is obtainable free on application to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

### Fodder Conservation Competitions.

COASTAL DISTRICTS CHAMPIONSHIP.

H. C. STENING, H.D.A., Chief Instructor of Agriculture.

Splended results were achieved by the championship fodder conservation competition conducted by the Royal Agricultural Society in the coastal districts. It was the most successful competition which has yet been held, far surpassing any previous effort, both as regards the total number of entries and also the high standard of quality of the fodders.

The agricultural societies of the South Coast responded most encouragingly, district competitions being organised by twelve societies, which is double the number conducted in any previous year, and, furthermore, the average number of entries in the local competitions showed a considerable improvement. This is the first time that the North Coast has been represented in the fodder conservation competitions, and it is to be hoped that the initial step taken by the Dorrigo Agricultural Society in conducting a competition will be followed by other societies on the North Coast. For the purpose of the championship competition it was necessary to combine the only entry from the North Coast Division with the South Coast Division, and the societies represented were Albion Park, Bega, Berry, Berrima district, Bodalla, Camden, Cobargo, Dapto, Dorrigo, Kiama, Moruya, Pambula, and Tilba Agricultural Bureau.

The marketing side of the dairying industry has been so well organised that the price of its products must be regarded as being very close to the maximum. No very material increase in prices can be anticipated, and in order that further progress may be made in dairy farming attention must be directed to a reduction in costs of production. There is no more satisfactory method of effecting this than by increasing the production per cow by better feeding. Good pasture is generally acknowledged to be the ideal feed for the dairy cow, but its limiting factor is that a continuity of feed, year in and year out, is not assured. It is not only during periodical droughts that pastures fail, but they deteriorate to such an extent during the winter months that it is highly desirable that they should be supplemented by conserved fodders. It has been shown by these competitions that there are many successful dairy farmers on the South Coast who are not relying solely on what nature is pleased to provide, but are conserving fodders to ensure that their herds are properly fed throughout the year.

The conditions and scale of points for judging the competitions in coastal districts are as follows:—

Fodders eligible for conservation to be:—Concentrates (including all grains), or roughage—as hay (e.g., lucerne, oaten, wheaten, clover, grass), silage, and any other fodder suitable for conservation, to have been produced on the land owned, leased, or held on shares by the competitor. No farmer or grazier whose holding consists of less than 30 acres will be eligible to compete.

SCALE OF POINTS FOR JUDGING.	Đ	oints,
1. Suitability and Quality of Fodder	 of	65
fodders for the purposes for which they are required	. 30	
(b) Judged as to appearance, apparent palatability, and nutritive and feeding values	. 35	
2. Location and Protection		10
(a) Locality—Location of the site, having regard to fire, flood economy in feeding and general access	. 20	•
(b) Protection—Protection from weather, pests, stock, fire, and general deterioration		
3. Economy of Production	• •••	25
4. Carrying Capacity	natural petitor's alent in	
5. Quantity of Fodder in Excess of Requirements		10

Much credit is due to Mr. H. Jeff Bate, of Bodalla, for his very efficient methods of fedder conservation, which have secured for him the coveted honour of winning the championship. He has set a very high standard, which should be an object lesson to dairy farmers generally. The quantity, quality, and combination of the fodders, as well as their efficient protection and general layout for convenience of feeding, have left nothing to be desired. On the property of 428 acres, of which 140 acres is serub of very little value for grazing, it was estimated that seventy-six cattle could be carried when under pasture. The conserved fodders consisted of 152 tons of maize silage, 45 tons of lucerne hay, 11 tons of eaten hay, and 12 tons of maize grain. The total quantity was sufficient for the feeding period of three months, and there was a surplus for another two months' feeding. The quality of the fodder was excellent and of a good variety, permitting a satisfactory balanced ration to be fed to the dairy herd. The silage was conserved in two reinforced concrete silos, well roofed, and adjacent to the feeding stalls, and the hay was well protected in a hay shed; the grain was in a corn crib close to the feeding centre. The corn crib was erected on piles 3 feet from the ground, which were capped with galvanised-iron plates to prevent the entrance of rats and mice.

Mr. H. J. Bate, M.L.A., of Tilba, who ran second to his son in the championship, is well known as an ardent enthusiast on the subject of fodder conservation, and his success illustrates that he practises what he preaches. The carrying capacity of the holding, which is 290 acres in area, was assessed at seventy head, and there was ample fodder conserved for the feeding of this number of cattle for the specified period, namely, 188 tons

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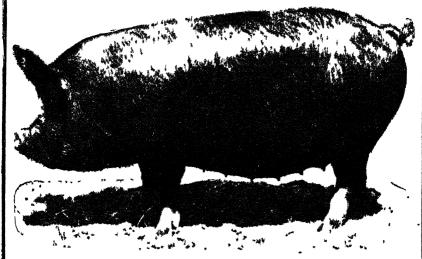
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C. D. ROSS, Under Secretary, Box 36A, C.P.O., SYDNEY.

of maize silage in two overhead silos—one constructed with brick and the other with reinforced concrete—and 13 tons of lucerne hay in a loft. The quality of the whole of the fodder was of a high standard, but the proportion of lucerne hay was too low for the provision of a balanced ration. The fodder was all well protected, and situated alongside the feeding stalls.

Judging was commenced at Pambula on 9th June and completed at Dorrigo on 20th June.

TABLE of Awards-South Coast and North Coast Divisions.

Society.	Name and Address, of Competitor,	Suntability.	Quality.	Location.	Protection.	Economy of Production.	Carrying Capacity	Surplus.	Total.
Maximum points		30	35	20	20	25	60	10	200
7. Cobargo  8. Bega  9. Dorrigo  10. Berry  11. Dapto	"Mountain View," Tilba Athol Bartlett, "Kurra- junbra," Moruya Mrs. H. E. Gower, "Cift Farm," Albion Park Porter Bros., "Corsto- phine," Camden A. C. Brown. "Colling- wood." Exeter R. E. Salway, "Narara," Cobargo D. R. Gowing, "Jellat South," Bega W. S. Rogan, "Booroola," North Porrigo J. R. Shepherd, "River- view," Bomaderry E. T. Evans, "Penrose," Dupto	29 25 27 27 27 23 23 23 21 26 28	33 32 30 30 29 30 29 28 30 32	19 14 16 15 16 18 17 14 18	19 19 16 18 18 18 18 17 16 19	22 23 22 22 21 23 23 18 23 22 22	60 60 60 60 60 60 56 60 45 42	3 7 1 3 2 3 1	185 178 176 174 173 172 167 166 165 162
12. Kiama 12. Pambula	J. M. Miller, "Karawar- ra," (Gerringong J. A. Martin, "Wood- lands," Pambula	23 23	31 25	16 16	18 18	22 18	51 38		161 138

Mr. Athol Bartlett, of Moruya, who was successful in winning the third prize, had made excellent provision for the feeding of the fifty-five head of cattle that the farm of 290 acres was estimated to carry when under pasture. The conserved fodder comprised: 85 tons of maize silage in an overhead silo constructed with concrete blocks, 134 tons sorghum fodder in stooks. 24 tons lucerne hay and 3 tons oaten hay stored in a galvanised-iron shed, and 16 tons of maize grain also in a shed; the whole providing a balanced ration for the herd for seven months, which is more than double the period adopted for the purposes of the competition. The fodder was of good

quality, but the sorghum stooked some distance from the feeding centre caused a reduction in points for protection and location.

#### General Comments.

It is interesting to note that eight competitors had made ample provision for the feeding of their herds over the winter, and had additional reserves to meet any emergency when the scarcity of natural feed necessitated hand feeding. All but two competitors have realised the value of maize silage for supplying the bulk portion of the feeding ration. Silage is the ideal foundation of conserved fodders for dairy cows, and maize is the ideal crop for making silage, owing to its good feeding value and its high yields of fodder. Three competitors relied upon the trench silo in which to conserve their silage, while the balance had erected overhead silos of either concrete, brick, or plain galvanised-iron. Where it can be made to fit the banking account, the reinforced concrete overhead silo is undoubtedly the best for the dairy farmer by reason of its permanency, general efficiency, and convenience for feeding in all sorts of weather. During the winter months, the feeding of the dairy herd is an every-day job, and in order to effect economy of time and labour and to avoid much inconvenience in carting fodder, particularly in wet weather, it is essential that the silos should be situated adjacent to the feeding stalls.

A pleasing feature of the competition is the more general attention that has been given to the provision of lucerne hay, which, when fed in combination with the silage, will serve to balance the ration. This indicates that the dairy farmers of the South Coast are not only making provision for the feeding of their herds during lean periods, but they are arranging to feed them intelligently and economically.

### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36a. (i.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

				.980.			
Junee (G. W. Scrivener)	***	Sept.	2, 8.	Barellan (W. McRae)	***	Ment.	24.
West Wyalong (A. Andrews)	***	,,	2, 3.	Ardiethan (T. Smith)	***	Oct.	ī,
Murrumburrah (W. Worner)	***	**	2, 3.	Quandialla (S. Tomkins)	***		*
Corowa (H. Norton)	***	"	2, 8.	Walbundrie (H. G. Collins)		**	<b>†</b> -
Parkes (L. S. Seaborn)	***		2, 8.	Leeton (W. Rosewarn)	٠.	**	<i>:</i>
Singleton (J. T. McMahon)		"	8, 4, 5.	Hay (George C. McCracken)	•••	**	·
Boorowa (S. G. Hughston)		1#	4, 5.	Hall (C. R. E. Southwell)	***	14	1, 2.
Cowra (E. P. Todhunter)	•••	**	9, 10,	Narrandera (J. D. Newth)		**	4 .
Barmedman (S. Pemberthy)	***	**		Patranders (J. D. Newth)	***	73	7, 8.
Bogan Gate (J. a Beckett)	***	**	10. 10.	Bribbaree (J. Aston)	***	11	8.
Denillania /D Tamen	•••	**		Ariah Park (M. Collings)	***	**	8.
	***	21	10.	Griffith (W. Snellin)		**	14, 15.
Canowindra (W. E. Forst)	***	7 2	12, 13	(Cootamundra (G. B. Black)		15	21, 22,
Forbar (F. 1018b)	•••	**	16, 17.	Millthorpe (T. P. Smith)	***	**	21, 22.
Forbes (E. A. Austen)	•••	>>	16, 17.	Lismore (H. Pritchard)		Dec.	8, 4, 5.
Temora (J. M. McInnes)	***	**	17, 18.	11			., .,
				1004			

			198	B1.		
,	Wollongong (W. J. Cochrane) Liverpool (B. O. Fitzpatrick) Castle Hill (B. Black) Neweastle (P. Legoe) Granvelle (B. Hyalop) Mathiand (H. A. Brown)	17 13 1 27 1 27	5, 6, 7. 6, 7. 18, 14. 17 to 21. 20, 21. 25 to 28.	Fenrith (C. H. Fulton) Gresford (A. R. Brown) St. Ives (A. Pickering) Brockvale Kempsey (E. Mitchell) Richmond (R. B. Tate)	*** *** *** ***	March 6, 7. ,, 18, 14. ,, 20, 21. ,, 27, 28. April 16, 16, 17. ,, 28, 24, 26.
	Blacktown (A. J. Greensway)		27, 28,			17 may may man

### Hand-feeding of Sheep Investigation at Nyngan Experiment Farm, 1928-29.

C. B. MULHEARN, B.V.Sc., Veterinary Research Officer, Council for Scientific and Industrial Research, and SIDNEY RUDKIN, N.D.A., Manager. Experiment Farm, Nyngan.

In the previous year, viz., 1927-28, a feeding test with penned sheep involving the use of farm-grown wheaten hay and wheaten silage was undertaken, and the results were subsequently published by us (Agricultural Gazette, vol. 40, 1929, pp. 751-760). In that test it was found that sheep on a ration of hay, or of hay and silage, maintained their condition well, whilst sheep on silage alone lost considerably in weight. It was decided, therefore, to repeat the experiment with certain modifications and the results are detailed below.

In order that the test might be sufficiently extensive, the experiment was this year carried out from shearing to shearing, i.e., for practically the whole twelve months, the test commencing at the termination of shearing on 14th August, 1928, and concluding at the beginning of the following shearing on 27th July, 1929.

Purpose of the Experiment.

To study the effect of feeding penned sheep for an extended period upon-

- (1) A minimum ration of hay, such as would be fed in times of drought.
- (2) A normal ration of (a) hay, (b) hay and silage.

Comparison was afforded by similar sheep fed on natural pasture, and the several points observed included—(a) health of the sheep, (b) general nutrition of sheep, (c) wool production, and (d) breeding.

The Sheep Used.

The sheep used in the experiment were picked out from the same flock, and were all of the same age. In order to ensure uniformity, a careful selection was made by Mr. E. A. Elliott, Sheep and Wool Expert, of sheep of similar conformation and carrying the same type of wool. The sheep were picked out before shearing when carrying a full fleece of wool, and on being shorn the weight of the fleece of each sheep was recorded and a sample of the wool taken

After shearing, the sheep selected for the experiment were weighed and then divided into four approximately even groups as follows:—

Group A.	Group B.	Group C.	Group D.
lb.	lb.	lb.	lb.
L. 42 119	L. 58 112½	L. 140 1103	L. 138 1091
L. 85 99	L. 103 99	L. 115 98	L. 126 103
L. 41 98	L. 133 96½	L. 143 961	L. 147 961
L. 129 941	L. 93 94	L. 174 93	L. 92 94
L. 49 91	L. 148 881	L. 161 861	L. 94 84
L. 46 86	L. 81 85	L. 172 81	L. 109 81
Total 587}	Total 575½	Total 5651	Total 568

Fodders Used and Routine Adopted.

The silage was made from a crop of Firbank wheat, grown in 1925 on 830 points of rain, cut green and pitted immediately. No weeds were present in the crop, and the growth was not rank. When opened up for feeding the top half of the pit was, to external appearances, a good sample of sour silage. possessing the customary smell and colour. The bottom layers were lighter



Group A.





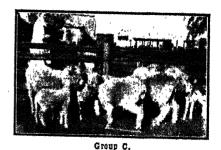
Group B.



Group B.



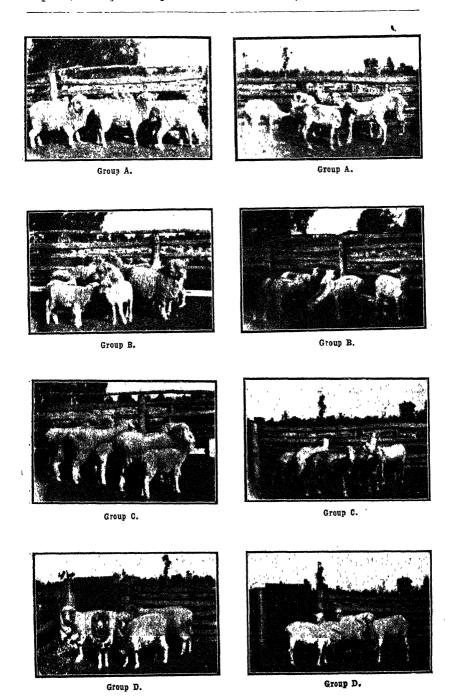
One Month after Commencement of the Test.



Eight Months after Commencement of the Test.

in colour and comparatively wet, with a somewhat unpleasant odour. The sheep showed a preference for the latter, as evidenced by the less amount of feed wasted.

The hay used was baled wheaten hay, grown on Nyngan Experiment Farm in 1928 on 489 points of useful rain. It was of mixed varieties, was harvested at the flowering stage, and when cured possessed a good colour and smell. After standing in the stook for three weeks it was baled and stored in the hay shed.



Before and after Shearing at the End of the Test.

The sheep were fed as follows:---

Group A-1 lb. hay per head per day.

Group B-2 lb. hay per head per day.

Group C-12 lb. hav plus 12 lb. silage per head per day.

Group D—These were returned to the flock and allowed to run on the natural pastures, and so were kept as a control to the sheep being hand-fed.

Groups A, B and C were run in neighbouring yards, and were changed about from time to time. The sheep were fed from hessian troughs, and there was ample room in each pen for all the sheep to be feeding at the one time. Water was supplied in wooden troughs, and minerals in the form of 5 per cent. Epsom salts in coarse salt, were available to the sheep at all times. Each pen had shelter and natural shade. The ration was fed in two feeds on week-days. one in the morning and one in the afternoon, but on Sundays the whole ration was given in one feed.

From the 18th May, 1929, till the conclusion of the experiment the ration of Groups B and C was increased by 4 lb. of hay daily to make allowance for the feed eaten by the lambs.

### Breeding of Groups B and C.

At the general mating time for the whole flock, Group B ands C were mated with one plain ram. The ewes were allowed to run with the ram at night, but were separated and fed in their distinctive pens during the day time. The ewes were mated from 2nd November till 5th December, 1928. The ram commenced working among the ewes shortly after being joined, and continued to serve them as they came in season.

Lambing commenced on 3rd April, and continued till the 29th April, 1929. Ten of the twelve ewes bore lambs, but one lamb was born dead and one died the day after it was born. The remaining lambs were marked and did well till the conclusion of the experiment. Eight lambs were marked from twelve ewes, i.e., 66 per cent. Two ewes failed to get in lamb and there were no twins.

The general lambing among the flock ewes in the paddocks took place at the same time, and 505 lambs were marked from 964 ewes, i.e., 52.4 per cent lambing.

The following are the particulars of the ewes with lambs:-

### Group B.

- L. 58 ... Lambed 22nd April, 1929, wether lamb.
- L. 103 ... Lambed 20th April, 1929, ewe lamb, died 21st April, 1929.
- L. 133 ... No lamb.
- L. 93 ... Lambed 6th April, 1929, wether lamb.
- L. 148 .. Lambed 17th April, 1929, wether lamb.
- L. 81 ... Lambed 23rd April, 1929, wether lamb.

### Group C.

L. :	140		Lambed	17th	April,	1929.	ewe lamb.
------	-----	--	--------	------	--------	-------	-----------

L. 115 ... Lambed 3rd April, 1929, wether lamb.

L. 143 ... Lambed 21st April, 1929, ewe lamb, born dead.

L. 174 ... Lambed 29th April, 1929, ewe lamb.

L. 161 ... Lambed 19th April, 1929, ewe lamb.

L. 172 ... No lamb.

There were five ewe and five wether lambs, but one ewe was born dead and one died, leaving five wethers and three ewes for marking.

### Observations on the Periodical Weight of the Sheep.

The sheep were weighed at monthly intervals for the first six months, and then on the 17th May, 16th July, and finally on 23rd July, 1929.

The following tables give particulars of the weighings throughout the experiment:—

WEIGHTS	of Sheep	in Group	D (on	Natural	Pastures).
---------	----------	----------	-------	---------	------------

			Weight	on	
Sheep	•	15/8/28, (Original Weight),	29 10 28.	62.4	(Pinal Weight)
		1b.	1b.	li lb.	1 lb.
L, 138		1093	118		937
L. 126		103	113	132	1023
L. 147		963	109	131	******
L. 92		94	107	130	734
L. 94		84	95	112	78)
L. 109		81	102	112	•••••
Total		568	644	*****	

In Group A, sheep L. 85 lost weight considerably at the commencement of the experiment and continued to show a loss at every subsequent weighing. This ewe injured a hind leg just after the commencement of the experiment, and although it was fully recovered about a month later, she never seemed to be able to join in with the other sheep and get a fair share of the ration.

As the sheep did not commence eating too readily and were fretting on account of being penned at the beginning of the experiment, their los- in weight at the first weighing was heavy.

The following table shows the average loss per head at the first weighing on the 15th September, 1928, and the average loss at the last weighing on the 23rd July, 1929.

Losses in Weight to First and Last Weighings.

Sheep.	Original Weight on 13/8/28,	Weight. on 15/0/28.	loss.	Average Loss per head.	Weight on 23/7/29.	Lors since 18/8/28,	Average Loss per head since 13/8/28.
The state of the s	lb.	lb.	lb.	ъ.	16.	16.	16.
1 1	G	roup A (F	Ration, 1	lb. hay per h	ead per da	y).	
L. 42 L. 85 L. 41 L. 120 L. 49 L. 46	119 99 98 94 <u>1</u> 91	98 77 82 80 79 <u>1</u> 70	21 22 16 14 <u>1</u> 11 <u>1</u> 16	16-83	70 45 75 70 581 581	40 54 23 24 32 27	33-58
Group B (Ration, 2 lb. hay per head per day).							
L. 58 L. 103 L. 133 L. 93 L. 148	112½ 99 96½ 94 88½ 85	1001 87 83½ 75 76 79½	12 12 13 19 12 <u>1</u> 5 <u>1</u>	12.33	72 79 82 64½ 60 57	40½ 20 14½ 29½ 28½ 28	26-83
	Group C (Ration, 11 lb. hay plus 11 lb. silage per head per day).						
L. 140 L. 115 L. 143 L. 174 L. 161	98 961 93 861	102 90 85 87½ 83 69½	81 8 111 51 111 111	8-08	81 714 70 664 55	261 261 171 261 311 22	25-04

In Group A the initial loss in weight was heaviest, being, on an average, 16:83 lb. per head on 15th September, 1928. These sheep recovered slightly after the first weighing and held their condition for a few months, but following this they gradually lost weight till at the conclusion of the trial they were, on an average, 33:58 lb. per head lighter than their original weight.

In Group B there was a heavy initial loss in weight, the loss being, on an average, 12.33 lb. per head on 15th September, 1928. These sheep then all increased in weight until on 15th February, 1929, they were only slightly over 3 lb. per head lighter on the average than at the beginning of the experiment. This group lambed during April, and when weighed again in May there was a considerable loss in weight in the ewes that had borne lambs. L. 133 did not bear a lamb, and did not show any decrease in weight between 15th February and 17th May, 1929, but remained about her original weight almost to the conclusion of the experiment. She was then the heaviest sheep in the group. Although L. 103 produced a lamb it only lived for one day, and after lambing she increased in weight, and was the second heaviest ewe in this group. Of the ewes that reared lambs the loss in weight varied from 28 lb. to  $40\frac{1}{2}$  lb. This loss is quite considerable when compared with the losses of ewes L. 133 and L. 103, which failed to rear lambs. From these tigures it is apparent that the rearing of lambs had its effects upon the general nutrition of the ewes.

The initial loss in Group C was not so heavy as in Group A and B, being, on an average, 8.08 lb. per head. This group also gradually increased in weight up to the weighing on the 15th February, 1929, but at the next weighing (on 17th May) there was a marked decrease, following the lambing during April. The four ewes that reared lambs, as in Group B, showed a greater loss in weight than the two that failed to rear lambs, but the difference in weights was not so pronounced in this group as in the former.

The average losses per head of the penned sheep for the duration of the experiment were:—Group A, 33.58 lb. per head; Group B, 26.83 lb. per head; Group C, 25.04 lb. per head. Group A, on a minimum ration, as would be expected, showed the greatest average loss per head, but, nevertheless, it compares very favourably with Groups B and C on more liberal rations. The final results in the latter groups were fairly even, and it would appear that there was very little difference between the nutritive values of the two rations.

The sheep in the control Group D, which were run on the pastures, were weighed three times after the commencement of the experiment. Although the season was very dry, there was plenty of natural feed in the paddocks till about the end of February and the flock sheep generally were in good condition. From this time onwards the natural feed was gradually diminishing, till it was necessary to hand feed ewes and lambs from 11th June, 1929, or about the last six weeks of the duration of the experiment. The rate of feeding was estimated at 3 lb. of silage and 1 lb. of hay per head of big sheep, fed on alternative days. The control ewes (Group D) were included amongst

the sheep that were being hand-fed. The following is a comparison of the weights on 6th February, 1929, and at the conclusion of experiment, with the original weights.

		****			1		
Sheep.	Original Weight (13/8/28).	Weight on 6/2/20.	Gain.	Average Gain per head. to 6/2/29.	Weight at con- clusion. (23/7/29).	Loss.	Average Loss per head sinc 13/8/28.
L. 138 L. 126 L. 147 L. 92 L. 94 L. 109	103 96½ 94 84	lb. 132 131 130 112 112	1b. 29 34½ 36 28 31	lb, 31·7	1b. 933 1023  731 781	1b. 15‡ } 20 <u>\$</u> 5 <u>!</u>	lb.

GAINS and Losses in Group D.

It will be seen from the above table that up to 6th February, 1929, the sheep had done extremely well, and were on an average 31.7 lb. per head heavier than at the beginning of the experiment. At the next and final weighing on the 23rd July, the sheep in this group were on the average 10.5 lb. per head lighter than their original weight, or 42.2 lb. per head lighter than at the last weighing. The general lambing had taken place in between the weighings, and although it was not definitely known which ewes had borne and were rearing lambs, all this group were picked out as wet ewes at the general division of wet and dry ewes on 3rd June, 1929.

#### Observations on the Wool.

All the experiment sheep, including the controls, were shorn separately on 27th July, 1929, and the fleece from each sheep was weighed and examined by Mr. E. A. Elliott, Sheep and Wool Expert.

The following table shows the weight of wool cut from each sheep, and gives a comparison between the weights for 1928 and 1929: -

	PLEECE W	eignus 1920 a	mq, 1929.	
Sheep.	Fleeco Welght 1928.	Average Weight 1928,	I leed e Weight 1929	i verage Weight 1929
	1b.	lb.	16.	1b.
T 10	1 74	n, 1 lb. hay per		r).
L. 42 L. 85 L. 41 L. 129 L. 49 L. 46	12 9 <del>1</del> 11 13 <del>1</del>	12-37	01 3 41 51 6 4	4-87

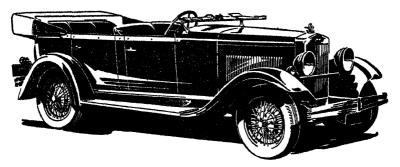
FLEECE Weights 1928 and 1929.

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SOUND ECONOMICAL INVESTMENTS

FLEECE	Weights	1928	and	1929—continued.

	P.LEEGE	Weight	s 192	8 and 19	929—contin	ued.	
Shee	p. Flee	ece Weight 1928.	Ave	rage Weight 1928.	Fleere Weight 1929		e Weight 029.
and the second s	1	lb.	1	lb.	lb.	1	1b.
	Group	B (Ratio	m, 2 lb	. hay per l	iead per day	).	•
L. 58 L. 103 L. 133 L. 93 L. 148 L. 81		$13\frac{1}{2}$ $12\frac{1}{2}$ $11\frac{1}{4}$ $10\frac{1}{2}$ $12\frac{1}{2}$ $12\frac{1}{2}$		12.12	6 6 <sup>1</sup> / <sub>2</sub> 5 <sup>3</sup> / <sub>4</sub> 5 <sup>1</sup> / <sub>2</sub> 5 <sup>1</sup> / <sub>2</sub> 6		·83
Grouj	C (Ratio	n, l½ lb.	hay pl	us l½ lb. si	lage per head	l per d	ay).
L. 140 L. 115 L. 143 L. 174 L. 161 L. 172		151 12 103 123 103 104 8		11-62	7 7 43 54 54 54 4		5.54
		Group 1	D (on 1	atural pas	ture).		
L. 138 L. 126 L. 147 L. 92 L. 94 L. 109		11½ 11 9 13 11¾ 13		11.81	93 93  11 84		9-68

Group B, it will be noticed, showed slightly to advantage as compared with Group C in the fleece weight, but both gave considerably better results than Group A. In the control group the average fleece weight in 1928 was slightly over 2 lb. per head better than 1929.

### Observations on Body Condition at Conclusion of the Experiment.

After shearing the various groups were inspected by the Sheep and Wool Expert, who valued them as follows:—

```
Group A (minimum hay)—
     1 fair store at 12s. 6d.
                           ... Average per head, 10s. 10d.
     1 fair store at 12s. 6d.
     4 low condition at 10s.
Group B (2 lb. hay)-
     1 good store at 18s. 6d.
                             ... Average per head, 14s. 9d.
     1 good store at 18s.
     4 fair store at 13s. 6d.
 Group C (hay and silage)-
     1 good store at 18s.
     1 good store at 17s. 6d. ... Average per head, 14s. 7d.
     2 low condition at 12s.
Group D (control, on pastures)-
     4 good store at 17s. 6d. ... Average per head, 17s. 6d.
```

L. 49, of Group A, was killed at the conclusion of the experiment, and the carcase was dressed in the usual way. The carcase was in fair condition, and a fair quantity of fat was in evidence. No gross abnormality was observed in any of the internal organs.

#### Conclusions.

An outstanding feature of this experiment was the fact that the sheep in Group A held out so well and grew a sound fleece of wool on a ration of 1 lb. of hay per head daily over a period of almost twelve months. As a group their condition was fair at the conclusion, and the general health of the sheep was good right throughout the experiment.

Group B, on a more liberal ration of hay, and Group C, on hay and silage, as would be expected, did better than Group A. In every case there was a heavy initial loss in weight and condition, though Group C suffered least in this respect, but when the sheep settled down they held their condition very well, particularly Groups B and C on the better rations. These latter groups showed a heavy loss in weight following lambing, but even so they were in fair to good condition at the conclusion of the experiment. Group D on the natural pastures did very well for the first six months of the test, but they then also lost weight and were only in slightly better condition than Groups B and C at the conclusion.

The general health of sheep was quite good right throughout the experiment. Although Groups B and C had been penned and fed on their set rations for two and a half months prior to mating, they took the rams as under natural conditions and ten of the twelve ewes bore lambs. Eight lambs were marked, i.e., a 66 per cent. marking. This compares favourably with the 52.2 per cent. general lambing of the flock ewes, but it must be remembered that the loss of lambs in the paddock would be much greater than in the pens, where they are protected from the usual mishaps that befall young lambs. The lambs with the penned ewes were quite strong and healthy, and at the conclusion of the experiment compared favourably with the lambs in the paddock, though the latter were also being hand-fed.

### NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.

The common number of the contract and th

THE Co-operative Bud Selection Society, Ltd., supplied the following selected orange buds to nurserymen during the 1930 budding season, trees from which should be available for planting during the 1931 planting season:—

1			Buds of	Buds of
TD Administration To the second		Wast	ington Navel	Late Valencia
T. Adamson. Ermington	***	***	3,000	3,000
W. Beck, Epping	•••		1,000	1,000
A. T. Eyles, Rydalmere	***	***	3,000	2,000
J. de Freitas, Fairfield	***	***	200	200
R. Hughes, Ermington		***	1,000	1,000
L. P. Rosen and Son, Carlingford B. E. Yarnall, Ourimbah	i	•••	5,000	1,200
Tr. m. rathan, Ourimpan	***	***	100	100
~ ~	G	195.1		

-- C. G. SAVAGE, Director of Fruit Culture.

### Sweet Potato Trials, 1930.

FARMERS' EXPERIMENTS DEMONSTRATE THE BEST VARIETIES.

#### J. DOUGLASS, H.D.A., H.D.D., Agricultural Instructor.

Sweet potato variety trials were conducted in many districts of the State during the past season with the object of popularising the high-yielding, better-quality, proved varieties. The whole of the varieties under test have been experimented with for a number of years now and have clearly demonstrated that they outyield and are better varieties to grow than the older known ones. The shape of the chunky types is one of the desirable characteristics of the improved varieties, as it minimises damage during transportation to market.

Growers are strongly advised to make individual plant selections for the production of rooted plants for next year's planting. "Curly top," a suspected virus trouble, is spreading in our sweet potate areas, and much evidence is noticed of the rapid degeneration of present varieties. Plants that only form up clusters of fibrous roots are becoming more common; also plants that produce only one tuber of abnormal size are more frequently seen. The individual plant to select for "seed" is one that produces five or six tubers of even shape and size. These plants should be of early maturity, free from blemishes, disease, and all traces of curly top.

#### An Unfavourable Season.

The season was not an ideal one for sweet potatoes. The chief difficulty was experienced early in the season; the spring was a very late one, frosts being experienced in many districts right up until December. Even in favoured coastal districts cold weather was the rule until mid-November. These unseasonal conditions prevented the normal sprouting of the seed, or parent, tubers. The result was that late field planting was the rule in all districts. The soil took some time to warm up and even during the summer the vine growth was slow. The heavy autumn rains were rather cold and reduced the soil temperature in some cases to such an extent as to prevent the tuber development. This was the case in the late planted plots at Wellington, Holgate, and Dubbo. On the lighter soils at Terrigal and Wamberal the rains came at the correct time, producing heavy yields.

YIELDS in Sweet Potato Variety Trials, 1930.

Min-solvent annual	Nar	icy I	Iall.		Yello rasbu			out he Quee		F	'iersoı	n.	D	irect	or.	White Maltese.
W. Forbes, Terrigal Roy Wallent, Wamberal A. E. Hoy, Macquarte Fields W. T. Sunderland, Dubbo G. Townsend, Penrith	18 9 6	5 9 	3 2	11 16 23 7	17 1	3 2 3 3	14 10	0 12 15	1 3 2		11	2	17	cwt.	3	t.cwt.qr.

It was very pleasing to see the heavy yields produced at Macquarie Fields, in the Liverpool district. The soil is medium loam and excellent cultural methods combined with correct irrigation practice were responsible for the success of the crop.

The medium-class soils of Penrith and Macquaric Fields have proved this season to be eminently suited for sweet potato growing. The results of these trials should encourage growers in these districts to grow larger areas of this crop. It is, however, essential to use a fertiliser mixture of equal parts of bonedust and superphosphate for best results.

### Irrigating the Crop.

It might be mentioned that the correct irrigation practice with this crop is not well understood by growers. If the land has been well prepared and fallowed, only a little water is required at transplanting time to ensure a perfect strike. For the first two months good cultivation is all that is required unless the soil becomes very dry. Early irrigation reduces the soil temperature, or promotes an abundance of top growth at the expense of tuber development. If at all possible, heavy irrigation should be withheld until the roots begin to swell. At this stage, providing the soil drainage is good, it is a difficult matter to over-irrigate. Waterings up to the equivalent of 4 acre-inches can be given at a time. The higher the soil temperature and the lighter the soil the heavier the watering.

### WELLINGROVE SEED MAIZE CONTEST AT NEW ENGLAND EXPERIMENT FARM, GLEN INNES.

In order to encourage the planting of further areas of Wellingrove maize the Department of Agriculture is again conducting a seed maize contest at New England Experiment Farm, Glen Times, under the same conditions as that carried out last year. This competition takes the form of a yield test, growers sending along 5 lb. samples of seed, which are sown under uniform conditions and on a selected area at the Experiment Farm. The Department's certificate will be awarded to the farmer whose sample gives the highest yield.

This test offers a rare opportunity for farmers who have devoted much attention to seed selection, and who wish to demonstrate the excellence of their particular strains. Previous tests along these lines have been very successful in improving the yielding qualities of maize varieties, as well as creating a demand for seed.

The Department wishes to point out that it will be necessary to limit the number of entries to about twenty-five, and the right is also reserved of refusing any samples not sufficiently pure or true to type. This is essential in order that the purity of the seed at the farm will not be endangered.

Samples should be addressed to the Manager, New England Experiment Farm, Glen Innes, and further information concerning the test can be had on application to the Under Secretary, Department of Agriculture, Box 364. G.P.O., Sydney, or from the Farm Manager.

### Southern and Western Districts Potato Crop Competitions, 1929-30.

RESULTS OF LOCAL COMPETITIONS AND R.A.S. CHAMPIONSHIP.

### A. J. PINN, H.D.A., Special Agricultural Instructor.

As in previous years, competitions were carried out in the southern district at Crookwell (53 entries), Batlow (27 entries), and Taralga (16 entries). The entries at each centre exceeded those of the previous year, the total numbering ninety-six. This year also saw the inauguration of competitions in the western district, where the entries totalled 34—Millthorpe 15 entries, Orange 10, and Oberon 9.

In both the southern and western districts the Royal Agricultural Society organised a championship competition, and in each case a silver cup trophy was donated. It was necessary that the winner of a local competition cultivate at least 5 acres of potatoes on his farm to be eligible to compete for the district championship. Each of the winners in the six local competitions cultivated the stipulated area and was therefore eligible to compete. The results were as follows:—

### SOUTHERN District Championship.

		Points.
1. E. M. Herring, Batlow—Redsnooth (8 tons 4 cwt. per acre)	•••	037
2. W. J. McPaul, Taralga—Factor (6 tons 13 cwt. per acre)	•	90}
3 O Frost Rannister Factor (5 tons 19 cwt per acre)		851

The following table gives an analysis of the points awarded in the Southern District Championship:—

	777.3.1	Freedor Dise		Qual	ity.	D!!	Allowance for	Total	
Competito	Yield.	Tops.	Tuber«.	Appear- ance.	('utting	Purity.	previous ('ropping.	Points.	
**************************************		 			T T				
E. M. Herring	•••	 41	51	4	144	133	141	1	932
W. J. McPaul	•••	 331	61/2	8	131	121	15	2	903
O. Frost		 293	63	72	131	121	15		851
				1		1	1		

### WESTERN District Championship.

					Pou	lus.
1	. T.	E. Fuller,	Spring Terrace-Late Manhattan (6 tons 15 cwt.	per	acre) 93	1
			Oberon-Factor (6 tons 16 cwt. per acre)			
3	. A.	Kingham	Millthorpe—Factor (4 tons 12 cwt. per acre)		78	7

An analysis of the points awarded in the Western District Championship are given in the following table:—

	Competitor,				Freedom from Quality.			Purity.	Allowance for	Total	
Competition			Yield.	Tops.	Tubers.	Appear- ance.	Cutting.		previous Cropping.	Point-	
Approximation and the second of				Ī							
T. E. Fuller	•••		334	61	43	14	141	15	5	93	
G. L. Brien			34	64	4	131	13	15	•••	86	
A. Kingham		•••	23	6}	53	131	123	15	2	787	
									<b>!</b>		

The cultural details of each plot are given in the reports of the local competitions.

The scale of points adopted last season were adhered to without alteration. Points awarded for yield were at the rate of 5 points per ton yield. Allowance for previous cropping was at the rate of 1 point for each potato crop grown on the land during the previous ten years. The yields quoted are for marketable potatoes, after excluding grubby, wilted, stag-end and "pig" tubers.

The first inspection of the plots was made as near as possible to coincide with full flowering period, and all plots were seen between 2 It January and 4th February. During this inspection deductions were made on account of impurities and also for diseased and degenerate plants, as indicated by the growth of the haulms. The digging of the plots was carried out during the period 7th May to 5th June. The deductions on account of impurities and disease were on a definite percentage basis. In each plot four counts, each of one hundred plants, were made in order to arrive at the percentage. In regard to virus disease it has been the practice to count only plants which show outstanding manifestations of the disease, more particularly in regard to leaf roll. The disease may be apparent in all degrees, ranging from very slight symptoms up to very definite deterioration in the robustness of plants such as when dwarfing is apparent in conjunction with rolling of the leaves and the whole plant assuming a yellowish hue in comparison to the normal colour of a healthy plant. The competitions have afforded farmers an opportunity of noting the difference in healthy and diseased types, and have impressed upon them the absolute necessity of eliminating as far as possible the degenerate types from their

In the search for better-yielding strains some farmers have had the opportunity of comparing their own seed with that of another grower's strain. Where seed has been obtained from men who are continually successful in the competitions the introduction has usually been of benefit, but when obtained from an untested source the result has often proved

that the introduction was a retrograde step. I have in mind the testing on several farms of a certain local strain which was considered a possibly good type. In each case the introduced strain proved to be a very poor type and the deterioration manifest in the top growth was also apparent when the crop was dug, the yields being only half those obtained from their own strains. However, there is ample evidence that the purchase of "seed" from successful competitors has been of great value in improving both the yields and quality of crops in certain districts.

It is also pleasing to note the greater care now being exercised in eliminating "off type" and poor-yielding roots at digging time, and also the greater improvement made where farmers are pegging plants whose foliage indicates a total freedom from virus disease, with the object of planting the progeny separately to provide stud seed from which the farm's seed supply will ultimately be produced.

During the past season the very dry period encountered in some districts encouraged the development of wilt. This disease requires close attention, and all plants showing this trouble should be pulled out and any tubers present destroyed. The progeny of many of these plants will be found to be soft and spongy, but in some cases apparently normal tubers are produced, and herein lies the danger of carrying over the disease to future crops. The farmer who undertakes the digging of portion of his crop is in a position to eliminate much of this trouble, as the appearance of the dead haulms indicates many of these wilted plants, these having a blackish stalk as compared with the brownish colour typical of a healthy plant.

Scab was mostly absent, but several crops were badly affected. Attention to dipping of seed will be necessary on the part of some competitors if this trouble is to be righted. Several competitors undertook dipping and are well satisfied with the results. It is particularly desirable that scabby seed be dipped if new land is to be kept free from infection.

Notwithstanding the dryness of the season, the close planting of the rows appeared to be an advantage. Even in such dry times it does not appear that spacing rows more than 2 feet 3 inches apart is an advantage. The planting of rows 3 feet apart appears to be a distinct waste of ground.

On old lands where the organic content of the soil was largely depleted the dry season caused the soil to set and influenced the formation of uneven shaped tubers. Whilst competitors are devoting more attention to the selection of seed, it is also necessary that the question of maintaining soil fertility be given greater consideration. Some potato-growers are still in a position to break up new land, but in the older settled districts the amount of new land available on the farms is very small. The sowing down of areas with other crops which will add to the organic content requires greater consideration. On farms where stock-raising is part of the farm operations, the simplest procedure is the sowing down of such crops as clover, but where crop farming only is in vogue, attention will need to be

given to such creps as peas, which not only help to bring about improvement, but at the same time allow of some return from the crop, either in the form of green peas or seed.

The variety Factor still retains its popularity and growers have had no difficulty in disposing of supplies of seed. The competitions have been of value in fostering more direct trade between the producer of seed on the tablelands and the potato-grower on the coast, who has to secure fresh supplies of seed each spring. The coastal growers are also prepared to pay a premium for high-class seed, and those growers who maintain their high standard are in some cases "booked up" long before the crop is ready for digging. This season the championship in the southern district weam to the variety Redsnooth, while in the western district the variety tate Manhattan gained the honour. Both these varieties are purely varieties for main-crop conditions. The appearance of both these samples was good and the cutting quality also high, more particularly in the case of the late Manhattan. This latter variety produced a crop with a very high percentage of table-sized tubers.

The competitors were keenly interested in the field inspections and afforded much assistance in the digging of the plots. I am also indebted to the local secretaries and others who helped in the organising work and arranged for transport from farm to farm.

### Crookwell District Competition.

This competition was carried out under the auspices of the Crookweli A., P. and H. Society, and entries were received from the following centres:
Bannister, Gullen, Cottawalla, McAlister, Roslyn, Kialla, and in the vicinity of Crookwell township. For the coveted honour of winning the silver cup presented by the society, thirty-three plots were presented for final judging.

The season was one of the driest on record, as practically no useful rain fell on the cultivated areas during the critical periods of growth, in January, February and March. Although the yields were considerably below those of previous years, they must be considered very satisfactory in view of the season.

It will be noted that the yields range from 19 ewt, per nere up to 5 tons 19 ewt, the thirty-three plots averaging 3 tons 5 ewt.

Mr. O. Frost, of Bannister, who is the winner of this year's competition, tied for first place in the competition the year before last.

For the plot an area of new land—red basalt country—was selected and ploughed in mid-September. Before planting on 25th November the land received two harrowings, the planting being on the cross of the first ploughing. Medium-sized seed was planted whole. The seed had been pitted during winter and in the spring was partly greened. The area was fertilised with a special potato mixture at the rate of 5 cwt. per acre. The cultivation after planting consisted of two harrowings.

CROOKWELL	District	Competition.
-----------	----------	--------------

Competitor.	Variety.		Yie	d.	Freed from Di		Qua	lity.		nce vious 1g.	
Comp. ara,	vancey.				Tubers.	Tops.	Appear- ance.	Cut- ting,	Purity.	Allowance for previous Cropping.	Total.
O. Frost	Factor .		t. cwt 5 19	293	63	73	131	12 ֈ	15		85}
M. McDonald	}	- 1	5 7	263	63 63 63	73	131	121	14	3	84 <del>[</del>
S. Lund	1	•••	5 4	26	63	73	131	$12\frac{1}{4}$	15	_	814
L. Dayton	1		4 14	234	$6\frac{3}{4}$	7 4	131	121	15		784
A. Gorman	1		$\frac{1}{4}$ 11	223	61	74	131	$12\frac{1}{4}$	15		77 <del>2</del>
M. McDonald	Common		4 4	21	$6\frac{1}{2}$	73	131	13	12	3	$76\frac{1}{2}$
Frost Bros	Tile of an	• • •	4 0	20	$6\frac{7}{8}$	8	131	121	15		75]-
V. A. Coggins	1	•••	3 18	193	$6\frac{1}{2}$	8	131	12‡	15	•••	743
Plumb and Wray	TT- 4- Date		4 2	201	$5\frac{5}{4}$	8	131	$12\frac{7}{2}$	14}		$74\frac{1}{2}$
H. E. Price	Factor .	•••	4 3	$20\bar{3}$	6	63	134	$12\frac{1}{2}$	15		743
Frost Bros			3 16	19	61	8	134	$12\frac{1}{2}$	15		741-
L. Dayton			3 18	191	6	7	$13\frac{1}{4}$	121	15	1	741
E. Nugent			3 13	184	6 1	71	13	13	15		$73\frac{1}{4}$
P. Leonard	Up-to-Date	•••	3 2	151	61	73	134	121	15	3	73
T THE		•••	3 9	174	$6\frac{1}{4}$	6	134	$12\frac{1}{4}$	15	3	$73\frac{1}{4}$
J. Flood	Factor .	•••	3 14	181	$6\frac{1}{4}$	74	$13\frac{1}{2}$	$12\frac{1}{2}$	15		73
T. A. Howard	,,	•••	2 12	13	61	8	13	$12\frac{1}{2}$	141	5	721
O. Frost	,,	•••	3 9	174	$6\frac{1}{3}$	8	123	$12\frac{1}{2}$	15	;	72
Bert Whittington D. Harries	l ':	•••		183	41	61	13	$12\frac{1}{2}$	141	2	$71\frac{1}{2}$
TO Managed	Washam	•••	3 10 3 6	171	51	74	$\frac{13\frac{1}{4}}{13}$	$\frac{12\frac{1}{4}}{12\frac{1}{4}}$	15 15	•••	$71\frac{1}{2}$ $71$
CILING TO	C	•••	2 17	161	6 <del>1</del>	$\frac{7\frac{1}{2}}{8}$	134	13	15	•••	70
A Common		•••	2 14	144	61	8	134	13	15	•••	691
A. Price and Son	TTm to That	•••	2 7	113	63	8	131	124	15		$67\frac{1}{4}$
	_	•••	2 5	111	61	72	131	$12\frac{1}{2}$	15		$66\frac{1}{4}$
D. Harries	Washan	•••	2 14	131	4	71	134	121	15	i"	66‡
H. E. Price		•••	2 3	103	61	74	131	121	15	î	$65\frac{1}{4}$
:Austin Price	l "		Ĩ 15	83	61	63	13	$12\frac{1}{4}$	144	3	$61\frac{3}{4}$
Lowe Bros	· · · ·		1 18	91	61	71	131	12	131	2	$64\frac{1}{3}$
E. M. Lenny	YY 4 - TV 4		1 15	83	53	8	123	121	13	3	$63\frac{5}{4}$
Lowe Bros	Wasten		1 11	74	61	73	123	$12\frac{3}{2}$	$14\frac{1}{2}$	2	$63\frac{1}{2}$
,,		•••	1 7	63	61	71	12	$12\frac{7}{2}$	15		60
**	President	•••	0 19	43	$6\frac{1}{2}$	8	12	$12\frac{1}{2}$	121		56
<b>.</b>	1					1			1		l

Mr. Moreton McDonald's plot was situated on his "Redground" property. The soil is of good quality, being a red chocolate, free loam. Before being broken up it grew a heavy crop of bracken fern, and there was much rock. After growing two crops of potatoes it was spelled for a season and again planted to potatoes for two seasons, so that the competition plot has had three previous crops of potatoes. As in the winner's crop, there was little waste and the tubers were of excellent appearance. For the present crop the first ploughing was in mid-September and planting took place about 10th November. One harrowing was given between first ploughing and planting. Seed was of fair size and mostly cut. A light application of special potato fertiliser (1 cwt. per acre) was given at planting, and the after-cultivation consisted of two harrowings.

Mr. Svend Lunn, McAlister, secured third place with a crop of Factors also. New land was selected and first ploughed in mid-June. The land was harrowed in October and springtooth cultivated later in the same month.

Superphosphate (2 cwt.) was drilled in with a combine in the same month, and planting was carried out on 8th November, using whole seed of medium size. The seed had been stored in bags in a shed during winter and was the progeny of roots selected the previous year. After planting, one harrowing was given and the crop was scuffled the first week in January.

### Batlow District Competition.

This competition was conducted by the local branch of the Agricultural Bureau in conjunction with the Agricultural Society.

The competition was divided into two sections: (a) For whiteskin varieties and (b) for redskins, and for each section prizes were awarded on the following basis:—First, £1 10s.; second, 18s.; third, 12s. There were fourteen finalists in the whiteskin class and seven in the redskin section.

The results were as follows:-

Bathow District Competition (Redskin Section).

	\$7t	Yiel	d.	Free from Di		Qua	lity.		S. 1711.	-
Competitor.	Variety.	Weight.	Points.	Tubers.	Tops.	Appear- unce.	Cut-	Parity.	Allowan ior prev (roppin	Total.
E. M. Herring J. Bryant R. H. Quarmby J. Bryant J. Dodds C. Buchele	Redsnooth Tas, Brownell Early Manistee Ta Brownell Queen of Valley Ta Brownell	t, cwt. 8 4 7 3 3 9 3 5 3 0 2 18 2 15	41 352 174 164 15 141 137	51 61 61 62 63 63	4  01	141 14 132 14 14 14 131 14	131 131 141 131 131 131 134	144 15 144 15 14 14 15	1	932 852* 661 661 632 634 63

<sup>\*</sup> This entry was not eligible for second prize, as Mr. Herring won a prize in this same section with another plot.

BATLOW District Competition (Whiteskin Section)

Commentation	37 - ml + 4 - 1	Yie	ld.	Free from D		Quali	ty.	l	2 3		
Competitor.	Variety.	Weight.		Tubers.	Tops.	Appear- ance.	Cut- ting.	Parity.	Allowance for previous Propping.	Trtal.	,M
J. A. Bartell C. Barberie E. M. Herring J. H. Bryant R. H. Quarmby C. Buchele F. W. Gunther P. and E. Quarmby Butz Bros. J. Quarmby E. Skerry Butz Bros. J. Bryant J. Dodds J. Dodds	;; ···	t. ewt. 6 7 7 6 6 6 5 11 1 4 10 1 4 16 1 4 8 1 3 14 1 4 12 2 18 2 7	31 32 32 1 2 2 32 2 2 2 3 2 2 2 3 2 2 2 3 2 2 3 2 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	7. 1832-79-74 sq-manufactory 5.7 (6.6666666666666666666666666666666666	65356545 522544	134 134 134 134 134 134 134 134 134 134	12 1 13 1 13 1 13 1 13 13 13 13 13 13 13 13 13 13 13 13 13 1	15515 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1544 - 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	85 82 82 81 77 77 77 72 66 82	ļ

The average yield of all plots in both sections was 4 tons 11 cwt., which was most satisfactory in view of the poor summer rainfall. At West Batlow the rainfall during the critical months was 140 points in January in two falls, 60 points in February in six falls, and 20 points in March in three falls. In the vicinity of Batlow itself the rainfall was not quite as high during January, but was greater during February and considerably more during March. There is a big variation in the registrations owing to the patchy nature of the falls and the limited distribution of some of the storms. Mr. Herring was more fortunate than other competitors in regard to rainfall, this fact being reflected in the yields he obtained.

Mr. E. M. Herring secured first place in the redskin section with the variety Redsnooth, and this was the plot which also won the Southern District Championship. This plot had previously been cropped to potatoes and the land was ploughed in early September, and during November the area was disced and harrowed. Planting took place on 5th December, and was done with the aid of a machine planter. Superphosphate was used at the rate of 2½ cwt. per acre. The seed had been stored during the winter in bags, and in spring, when the worst of frosts had gone, was spread out under trees and allowed to green. Close planting was adopted, the rows being at the rate of thirty-one to the chain. After planting the crop was harrowed on 23rd November, and scarified on 7th and 28th January.

The Redsnooth variety was developed on Mr. Herring's property some years back. It is a particularly attractive-looking variety with a bright red-wine coloured skin. During past years the variety has not been an outstanding success, but evidently the conditions this year proved suitable. The cutting quality was satisfactory and the tubers were of good shape.

Mr. J. A. Bartell, who was the winner in the whiteskin section, first ploughed his plot in early September, and harrowed at intervals before planting on 5th December. The seed had been stored loose in a shed; no fertiliser was applied at planting. The crop only received one cultivation.

Notwithstanding the dry season the loss from grub infestation was not very heavy and many fields were almost free. The appearance and cutting quality were for the most part good, but Mr. Herring's Factors were poor, being rather of a yellow colour and somewhat watery in core compared with others.

Most samples were fairly free from scab, but a few showed evidence of too great an infection, including the sample from the winning plot of Redsnooth. It will be noted that the deductions on account of disease in top growth are greater this season. Many points could have been saved had the competitors removed the outstanding virus infested plants before judging. The Tasmanian Brownell variety had been particularly bad in regard to the amount of leaf-roll present, and the generally low yield of the variety is probably a reflection of this trouble.

### Taralga District Competition.

This was the fourth annual competition carried out by the Taralga A. P. and H. Society. Fourteen plots remained in for the final inspection, with the following results:—

TARALGA	District	Competitie	11.
---------	----------	------------	-----

\$ 		Yield.		Freedom from Disease.		Quality		1	TENE T	
Competitor.	Variety.	Weight.	Points,	Tubers.	Tops.	Appear- ance.	Cut- ting.	Purity.	All the last	Tertific
W. J. McPaul  R. E. Ball D. Wright R. J. Ball D. Wright J. J. Molonev J. F. MacClell R. E. Ball J. Howard W. J. McPaul L. North A. Johns	(2) (1) (2) (2) Up-to-Date Carman Factor Satisfaction Carman Factor	6 4 5 13 4 16 4 19 4 6 4 9 4 14 4 0 3 9 2 8 3 4 4 2 4 6	33 1 28 1 24 24 24 2 23 2 20 17 1 16 16 11 1 2	66 66 66 66 66 66 67 56 63 64 65 65 65 65 65 65 65 65 65 65 65 65 65	878 878 888 888 788 752 752	13 1 13 1 13 1 13 1 13 1 13 1 13 1 13	122 122 122 122 122 122 122 122 122 122	15 16 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 16 16 16 16 16 16 16 16 16 16 16 16 16	1 1 1 1 2 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1	1034* 8724 8054 7774 7774 7754 7034 687

<sup>\*</sup> This entry was not eligible for second prize owing to Mr. McPaul having secured a prize with another outry of the same variety.

The average yield of the fourteen plots was 4 tons 6 cwt., which is highly satisfactory considering the very dry summer experienced. During the critical period of the crops' growth practically no falls of any value were recorded as the following registrations will indicate:—January, 50 points in seven falls; February, 70 points in five falls; March, 79 points in eight falls.

Previous competitions have done much to set up a demand for seed from the leading local growers. Requests this year were greater than ever and most competitors booked up all their supplies at a considerable premium over strains of unknown value. The great pity is that larger areas of potatoes are not under cultivation, as there is ample good land uncropped in the district and an increasing market for district strains of seed. The demand for seed was also influenced to some extent by the results of strain trials (which included Taralga-grown seed) carried out in coastal districts. These trials enabled farmers there to gauge the worth of the certified strains as compared with those of no particular pedigree.

The winner was Mr. W. J. McPaul, who had previously won the local competition two years ago and at the same time won the Royal Agricultural Society's Southern District Championship. Another entry by Mr. McPaul secured second highest award, but the rules of the local competition debar a



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competitor winning more than one prize with the same variety. The winning plot was grown on red basalt country typical of "Richlands." The cropping for the previous two years had been oats, which was cut for hay and the stubble grazed by sheep.

First ploughing was given in early September, the potato crop being planted on 4th November. Cultural operations between first ploughing and planting consisted of three harrowings. Medium-sized seed was used, portion of which had to be cut. Both seed and fertiliser (3 cwt. per acre of superphosphate) were dropped in the furrow after the plough. Cultivation after planting consisted of three harrowings and one intercultivation.



A Taralga Plot.

Mr. R. E. Ball, who was awarded second prize, is a successful local grower. He selected new land which was broken up in August, later ploughed, and harrowed five times before planting on 11th November. Both cut and whole seed were used, and 2 cwt. per acre of superphosphate was applied. After planting, three harrowings were given, two intercultivations, and in addition the crop was hilled.

Mr. D. Wright, who secured third prize, is a consistent prize-winner and has previously won the local competition on two occasions. He selected an area of land which had previously grown one crop of potatoes. The first ploughing was given on 1st October, and between then and time of planting on 15th November the land was springtooth cultivated once and harrowed once. Both cut and whole seed were used. At planting 150 lb. of superphosphate was applied, using the drill behind the plough. After planting, one harrowing and one intercultivation were given, and the crop also lightly hilled.

The cutting quality and appearance throughout were satisfactory in view of the unfavourable season. Some samples showed more seab than is desirable, and dipping of the seed in these cases seems necessary. One local grower who dipped seed for an area outside the competition was well satisfied with results and his success is expected to encourage other growers. In this case corrosive sublimate was used for treating the seed tubers.

### Orange District Competition.

This was the first competition inaugurated by the local Agricultural Society, and it is unfortunate that such an unfavourable season was experienced. Liberal prizes of £5 5s. for first and £2 2s. for second were offered in each of the two classes, i.e., whiteskins and coloured skins. In addition to the monetary prizes, a silver cup also has been donated for the highest award, irrespective of the class. To win the cup outright it is necessary for a competitor to win twice in succession or three times in all.

RESULTS of the Orange District Competition.

	1	Yleld.	Freedom from Disease.	Quality.	ce for cropping.	,
Competitor.	Variety.	Weight.	Tubers. Tops.	Appear- ance. Cutting	Purity. Allowance previous cre	Placing.
T. E. Fuller D. Quinlan K. Bowen T. Cummins M. Hiney M. Hiney	Late Manhatian. Early Manhatian Factor Langworthy Factor		61 47 61 51 61 61 61 61 61 61 61 61 61 61 61 61 61	14 141 132 141 134 122 13 121 131 122 131 122	15 2 7 15 7 181 6	lst (coloured) and cup. 2d (coloured). 1st (white). Tied for 2nd (white).

Mr. T. E. Fuller, whose farm is located at Spring Terrace, secured first prize in the coloured-skin section with the variety Late Manhattan, and as this was the highest award in both sections he also secured a "leg in" for the silver cup. Mr. Fuller was also successful in winning the Royal Agricultural Society's Western District Championship. He selected a plot of old land of basalt loam which had been cropped alternately with potatoes for many seasons back. The alternating crop was for the most part whent, which was harvested for grain.

The first ploughing in the preparation of this year's plot was given in the last week of August and the plot was harrowed immediately after ploughing to conserve moisture. The same procedure was adopted after the second ploughing in mid-October. Whole seed, ranging in size from 2 to 2½ oz., was dropped in after the plough, the spacing of the rows being approximately twenty-seven to the chain. The seed had been pitted during the winter, picked over and bagged to harden, and the bags occasionally turned to check growth. Planting took place on 29th November, after which the ground was immediately harrowed. A further harrowing was given the crop on

1st January, after a fall of rain. Mr. Fuller was better served in the matter of rainfall than other growers, the registrations on his farm during February was 1½ inches on the 6th, 100 points on the 14th and 120 points (partly hail) on the 15th of that month. Fifty points of rain was recorded on 26th March. The tubers were of good size and practically all of table grade. the amount of "pig" potatoes being negligible.

Mr. D. Quinlan, who secured second highest award in the coloured-skin section, grew a crop of Early Manhattan. This crop gave great promise during the early stages of growth, but the extremely dry season spoilt the prospects. The only useful rain which fell on this competitor's farm was 2 inches in December and 1½ inches in February. The land was first ploughed on 7th August and again on 7th November, two harrowings being given before planting on 5th December. Two-ounce tubers were used for seed and 180 lb. of superphosphate was applied in the furrow at planting. Cultivation after planting consisted of two harrowings and one intercultivation. The previous crop was turnips, which followed a crop of wheat cut for hay. The land had grown two crops of potatoes during the previous ten years.

In the whiteskin section the winner was Mr. K. Bowen with a crop of Factor. Mr. Bowen selected new land of red basalt loam, which was first ploughed on 10th July. Two harrowings were given before and two after the second ploughing. Planting took place on 2nd December, portion of the plot being planted with cut seed, but whole seed of 2 oz. size was sown on the major portion of the area. Some of the seed was selected, the balance being ordinary run from the "pit." Superphosphate at the rate of 100 lb. and sulphate of ammonia 90 lb. per acre were applied to the plot. One harrowing was given after planting, but further cultivation was prevented owing to the rapid robust top growth. The rainfall recorded by Mr. Bowen was 60 points during December, 10 points in January, 30 points for February, and 114 points during March. Frost prevented the crop from taking full advantage of the later rain. A good clean sample of tuber was produced, but the killing of the top growth prevented the formation of large tubers.

Mr. T. Cummins, who tied with Mr. M. Hiney for second place in the whiteskin section, also selected a plot of new land, which was first ploughed in the third week of July. The plot was twice disc-ploughed in October and harrowed four times before planting during the second week in November. Whole seed was used and the crop harrowed twice. This crop showed evidence of some admixture of variety and a fair proportion of second growth was in evidence. Some damage to the crop was caused by sheep. A number of tubers were greened through being too near the surface, and thus lost points for appearance and cutting quality.

Mr. M. Hiney's plot of Factor, with which he tied for second place, was on old land which had grown four crops of potatoes during the previous ten years. First ploughing was given on 2nd August. Further cultivation consisted of a harrowing on 20th September, ploughing 25th October, and

harrowing 21st October. Cut seed was used for planting on 18th November. The seed had been selected from bulk and stored in a shed. Special potato fertiliser was applied by means of the drill before planting, and also by hand in the furrow at planting time. The after-cultivation consisted of a harrowing and one intercultivation. Considerable loss in yield was occasioned through "bandicooting" of roots by passing travellers.

# Millthorpe District Competition.

This was the first competition held by the local Agricultural Society. Of the original fifteen centres only six were submitted for final judging. Prizes awarded by the Society were £5 for first, £3 for second, and £2 for third. The results were as follows:—

MILLTHORPE District Competition.

Competitor.	Variety.	Vield	i.	Freed fro Disea	11)	Qua	lity.	~	e for eropping.	
· ·		Weight.	Points.	Tubers	Tops.	Appear-	t utting.	Purity.	Allo vence previous	Total.
A. Kingham A. Kingham A. Kingham P. A. Kingham Oates Bros. Oates Bros.	Early Manhattan	3 17 4 6 4 0 1 16	23 191 211 20 9 121	63 65 65 65 65 65	57-44-57-4854 57-58-83-1854	141	120 141 141 141 121 121	15 15 18 11 15	וכופי: וכופוכי	782 784 784 721 601

The rainfall registration on Mr. A. Kingham's farm—this competitor secured all prizes—was as follows:—December, 283 points on seven days; January, 230 points on four days; February, 168 points on four days; March, 90 points on three days. The April rain was of no value as the tops had been cut by frost.

The winning entry was grown on land that had previously grown a crop of wheat which was stripped; previous to that the land had been grazed and fallowed. The last crop of potatoes was in 1923. The land for the present crop was first ploughed during the second week in September to a depth of 6 inches. It was then harrowed both ways, and cultivated both ways during the last week in October. Planting took place on 23rd November, cut seed being used. The seed, which had been selected in the field at digging and then stored in a shed, was dipped in formalin. Rows were almost twenty-two to the chain. Superphosphate at the rate of 2 cwt. per acre was drilled in during the first week of November. The cultivation after planting consisted of harrowings on 14th and 30th December.

The cultivation of the second plot (Redsnooth) was similar to that of the winning plot, except that planting was one day earlier and the seed was not selected in the field.

The plot of Early Manhattan which gained third place was planted on 25th November, whole seed being used. Seed was not selected nor dipped, otherwise the cultivation methods employed were the same as for the winning plot.

The cutting quality of the Early Manhattan was very good, as also was that of Redsnooth. The Factors were poor in comparison and showed the watery core which is common to this variety in most districts. The yellowing of the vascular system was also apparent in many tubers. The tubers were very free from scab and of good appearance.

## Oberon District Competition.

As was the case in the other western district competitions, this was the first competition carried out in the Oberon district. The local Agricultural Society awarded a prize of £5 to the winner.

Of the original nine entries only four of the plots remained in for final adjudication. Several competitors were anxious to dig their plots whilst good weather prevailed, and were also influenced by the seasonal demand for seed. The yields of the crops which remained in were satisfactory. Results were as follows:—

OBERON District Competition.

Names and the second se				1 - 7	Yield	1.	Free fre Dise	om.	Qu	ality.		nce for cropping.	_
Competitor.		Locality	•	Variety.	Weight.	Points.	Tubers.	Tops.	Appear- ance.	Cutting.	Purity.	Allowance i previous cro	Total.
G. L. Brien		Oberon		Factor	tons. cwt 6 16	34	61	4	13 <del>]</del>	13	15		86
C. L. Brien		"		Early Rose	6 1	30}	61	63	13}	131	15		85 <u>1</u>
G. H. Spencer		Gingkin	•••	Tas. Brownell	5 4	26	6	52	14	13	15	4	832
J. O'Connell		Duckmaloi		Early Rose	4 14	23½	61		13	13 <del>1</del>	142		70분
		, ,	ļ	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	. ,	• "						1	

The cutting quality of the tubers was fairly satisfactory, but there were imperfections in some tubers in that they showed an over-distinct yellowing of the vascular system. The Tasmanian Brownells were perhaps the worst in this respect. Factor from the winning plot was better than most white-skin varieties of the southern districts, but the starch distribution was not as solid as in the case of the redskins. The colour of the flesh was generally satisfactory.

The rainfall during the critical months in the crops' growth was: January, 160 points in two falls; February, 124 points in three falls; and March, 172 points in three falls. The April rainfall was scanty until 24th and 25th of the month, when 179 points were registered.

Mr. G. L. Brien selected new land for his winning plot. First ploughing was given in the last week in September and planting took place at the end of November, the seed being dropped in a funnel between furrows. No fertiliser was used. Close planting of the rows was adopted, the spacing being at the rate of thirty-two rows to the chain. Between first ploughing and planting the land was disc-harrowed. Cut seed of medium size was used, the seed having been pitted under grass without earthing. Aftercultivation of the crop comprised one harrowing.

The potatoes from this plot were of good size and shape. There was very little loss in the picking-up, practically the whole of the produce coming within the scope of "table" or "seed" tubers.



An Oberon Plot.

Mr. C. L. Brien's plot of Early Rose, which secured second place, was situated in close proximity to that of the winning plot, and cultural details were similar. This sample of Early Rose was good, and most of the tubers were of excellent shape and skin. The cutting quality of this lot was the best in the competition, but an odd tuber was marred through an overyellowing of the vascular system.

The third position in the competition was secured by Mr. G. H. Spencer, of Gingkin, with a crop of Tasmanian Brownell. Old land which had previously grown four crops of potatoes within the past ten years was selected. Previous to this crop of potatoes the land had grown two crops of oats. Planting took place on 20th November, when the stubble was turned onto the seed, which was one set size with the rose end out off. The seed had been previously stored spread out in a shed. A light dressing of

superphosphate (84 lb. per acre) was applied, while after-cultivation consisted of two scufflings, the crop being also hilled. The resultant crop was of good appearance, but scab was more in evidence than in other competitors' plots. The cutting quality was good in regard to solidity and distribution of starch, but some tubers were very badly yellowed in the vascular system and a slight flecking was also apparent.

#### TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Addre	88.				Number tested.	Expiry date of this Certification.
St. Patrick's College, Goulburn					9	7 Aug., 1930
Sacred Heart Convent, Bowral		•••	•••	***	11	17 , 1930
Walter Burke, Bellefaire Stud Farm, Appin (		•••	•••		52	17 ., 1980
J. F. Chaffey, Glen Innes (Ayrahfres)		•••	•••	•••	56	00 1000
Mittagong Farm Homes, Mittagong	•••		•••	•••	85	90 1000
H. W. Burton Bradley, Sherwood Farm, Moo	włona (T	awaawe	· · · ·	***!	79	4 Sept., 1980
				***;	94	E 1000
	•••	•••	•••		Š	10 " 1000
Riverstone Meat Co., Riverstone Meat Works	Rivore	tone	•••	•	115	27 , 1980
J. L. W. Barton, Wallerawang	29 TREACTO	ООДО	•••	•••	18	9 Oct., 1930
Diseas Chanalla Caminana 10144	•••	***			-5	
H. A. Corderoy, Wyuna Park, Comboyne (Gr		***	•••		54	1 Nov., 1930
Glen Innes Experiment Farm (Ayrshires)		***	•••	. 1	62	
S. G. Winkley, Dorrigo	•••	•••		•••	85	0 1000
T Damba Davis Davis Casas (Tassas)	***	***	•••	•	40	7000
J. Davies, Puen Buen, Scone (Jerseys)	hwood	***	•••	***	7	00 7 1000
Department of Education, Brush Farm, East	ewood	***	***	***	28	00 " 1070
Lunacy Department, Calian Park Mental Ho	shieri	•••	***	•••	30	
Bathurst Experiment Farm (Jerseys)	- • • • •	***	***	***		
Lunacy Department, Morisset Mental Hospit		•••	***	***	24	7 1001
Parbery, C. J., Allawah, Bega	•••	***	***		88	7 , 1931
Wagga Experiment Farm (Jerseys)		***	***	***	78	10 ,, 1931
Kinross Bros., Minnamurra, Inverell (Guerns	eys)	***	***	***	72	11 ,, 1931
New England Girls Grammar School, Armid	aie	•••	•••	***	19	16 ,, 1931
Lunacy Department, Parramatta Mental Hos	Di <b>te</b> r	***	***	•••	89	28 1981
Miss Brennan, Arrankamp, Bowral			***		10	19 Feb., 1931
Department of Education, Yanco Agriculture	n Higu s	cnear	***	***	88	21 ,, 1931
G. A. Parrish, Jerseyland, Berry		***	***		108	27 ,, 1931
Lunacy Department, Kenmore Mental Hospi	tai	***	***	***	76	28 , 1981
Hawkesbury Agricultural College (Jerseys)	***	***	***	***	160	1 Mar., 1931
St. Joseph's Girls' Orphanage, Kenmore	•••	•••	***	***	10	8 ,, 1931
St. Michael's Novitlate, Goulburn	***	***	***	•••	5	3 ,, 1931
Kyong School, Moss Vale	***	•••	•••	•••	8	4 , 1931
St. Joseph's Convent, Reynold-street, Goulbu	ırn	***	***	***	4	4 ,, 1981
St. John's Boys Orphanage, Goulburn	***	***	***	***	7	5 ,, 1981
Marion Hill Convent of Mercy, Goulburn	***	•••	•••	***	10	6 ,, 1931
Cowra Experiment Farm	***	***	***	***	29	6 , 1931
Riverina Welfare Farm, Yanco	***	***	***	•••	69	6 ,, 1931
Wilkins, James, Jerseyville, Muswellbrook	***	•••	•••		51	12 ,, 1931
Tudor House School, Moss Vale	***	***	***	***	8	21 ,, 1931
H. F. White, Bald Blair, Guyra (Aberdeen A	ngits)	***	***	***	202	3 April, 1931
Grafton Experiment Farm (Ayrshires)	***	***	•••		180	5 ,, 1931
Department of Education, Huristone Agricult	tural Hip	th Sch	looi	***	45	10 ,, 1931
Navna Ltd., Grose Wold, via Richmond (Jer	seys)	•••	•••		13	29 ,, 1981
Australian Missionary College, Cooranbong		***	•••	***	45	30 , 1931
McQuillan, J. P., Bethungra Hotel, Bethung	ra	•••	•••	***	6	1 May, 1931
George Rose, Avimenton		***	***		4	28 ,, 1931
William Thompson, Masonic School, Baukha	m Hills	•••	•••		48	28 ,, 1931
Department of Education, Gosford Farm Hor	Mes.		***	***	30	3 June, 1931
F. C. Kershaw. Macquarie House. Macquarie	Fields	•••	•••		71	5 , 1981
P. Ubrihien, Corridgeree, Bega	•••	•••	•••		114	6 , 1981
P. Ubrihlen, Corridgeree, Bega A. L. Logue, Thornbro, Muswellbrook	***	***	•••	***	40	23 July, 1981
A. Shaw, Barrington (Milking Shorthorns)	•••	•••	•••		122	9 Aug., 1931
E. P. Perry, Nundorah, Parkville (Guernseys		***	•••	****	22	18 ,, 1931
The second secon					,	

## EARLY MAIZE TRIALS ON THE CLARENCE RIVER.

REPORTING on last scason's early maize trials on the Clarence, Mr. M. J. E. Squire, Agricultural Instructor for the Ear North Coast, points out that the scason was dry in the early stages, but was so wet later on as to delay the maturing of the crops. Rainfall registrations for the growing period

at the two centres were 1,340 and 1,186 points, respectively.

The trials were sown on the farms of Messrs. W. H. Paine, Great Marlow, Grafton, and A. E. Collins, Lawrence. The soil in each case was alluvial loam and the previous crop maize. At Great Marlow the plot was ploughed in May, twice in July, and then harrowed, rolled and harrowed; it was planted on 7th August, 1929, along with 2 cwt. superphosphate per acre. The Lawrence plot was July ploughed, and rolled and harrowed and rolled, and was again ploughed, harrowed and rolled just prior to planting on 10th September, superphosphate being used at 2 cwt. per acre.

The yields were as follows: —

Management of the Control of the Con			rgagestern von 1 avest allen 11 auchten 1		1		Yie	dd.	
Va	riety.		Approximate f	Date Ri	pe'	Great A	iarlow.	Lawr	ware.
Wellingrove Leaming Early Morn Duncan's Golden Super Grace's White		•••	 3 January, 1 5 February 3 January 3 ,, 18 ,, 5 February,	930		bus, 61 52 56 42 44 44	lb. 33 2 5 41 0 7	bus. 77 66 61 57 51 46	1b, 43 11 43 11 43 10

Wellingrove, which has done well in previous trials, gave the highest yield at each centre. Learning is the standard variety used for early planting on this river; Grace's White, which matures at the same time, has not given good results, and Early Morn and Duncan's do not appear to suit the conditions. Golden Superb grew very well throughout, but was handicapped by a very poor germination.

How to Distinguish Phalaris minor from P. bulbosa Sked. Whilst the difference in the botanical characteristics of the seed of these two species is only slight, often requiring expert examination to distinguish them, as a general rule seed of Phalaris minor (Annual Canary grass) is broader at the base and is covered with dark-brownish coloured blotches, while that of Phalaris bulbosa (Toowoomba Canary grass) is of a lighter brown colour and more pointed at the apex.

If the seeds of these two species are subjected to a germination test, however, the radicle (root), and especially the root cap, of *Phalaris minor* will be found to display a red colour, whereas that of *Phalaris bulhosa* is greenish-white in appearance. An effective germination test can be carried out between sheets of blotting-paper, which should be kept moist with water and placed in a warm position.

Seed of *Phalaris bulbosa* is expensive, and as *Phalaris minor* is useless for pasture improvement work care must be exercised by the farmer or grazier when purchasing seed to ensure that he obtains the correct species.

The Department of Agriculture will be pleased to examine samples of seed at any time for intending purchasers.—J. N. Whitter, Agrostologist.

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# Maize Improvement by Breeding and Selection.

W. H. DARRAGH, B.Sc.Agr., Assistant Plant Breeder.\*

MAIZE is one of the leading crops of Queensland and the second crop of importance in New South Wales, and these states have naturally devoted some attention to its improvement by breeding and selection.

Maize improvement work was begun by the New South Wales Department of Agriculture at Grafton Experiment Farm in 1914, and some years later attention was given to it in Queensland. A review of the work accomplished and the present methods in progress has therefore been considered fitting for this meeting.

For a complete understanding of the methods of maize improvement now in progress a few preliminary observations on fundamentals are essential. As is well known, the maize plant is monoecious, that is, it produces male and female flowers (in the tassel and silk) on different parts of the plant, and by reason of this separation of the flowers, cross pollination to the extent of 95 per cent. or more is the natural mode of the crop.

The type of plant produced by any grain depends on the inherent characters of that particular grain, and is influenced, of course, by the environment in which the plant is grown. In maize, certain characters such as colour of the pericarp (seed coat), colour, texture and composition of the endosperm, chlorophyll characters in seedlings (e.g., albinos), dwarfness of growth, barrenness, and resistance to disease are definitely known to be heritable, and the inheritance of many of these has been shown to be mendelian, each being governed by one or more factors. Productiveness or yield in maize is probably a quality which is due to the expression of a number of characters which in themselves are highly complex, but it may be assumed that they follow the same fundamental laws of inheritance as do the simpler characters.

Cross fertilisation being the natural mode in maize, the expression of even simple characters is often very mixed, even in a single variety, as indicated by the variation between the plants and ears of the variety; nevertheless there are certain limits to these characters which define the variety. Any variety of maize is, however, sufficiently variable in composition to present characters which lend themselves to selection for their obvious or assumed effect on yield. Plumpness and soundness of grain when taken in conjunction with comparative size and weight of ear (under equal conditions) is the most important character with an obvious effect on productiveness, on which selection can be based. At least, some selection

<sup>\*</sup>Paper read before the Brisbane meeting of the Australasian Association for the Advancement of Science, June, 1930.

is necessary for the maintenance of the yielding capacity of a variety, and careful attention to this feature may even effect marked improvement in the variety. The question of selection for other characters which are supposed to have an influence on yield will be mentioned later on in this paper.

#### The Influence of Closeness of Breeding on Vigour.

From repeated experiments it has been shown that from the self fertilication or close fertilisation of maize there results a decided lack of vigour and a decrease in yield, while on the other hand, when crossing is resorted to, there is an immediate increase in vigour known as "hybrid vigour." This increased vigour is explained by the fact that the characters favourable to growth are generally determined by dominant factors or genes rather than by their opposite or recessive factors or genes. Self-fertilisation or fertilisation between closely-related plants generally gives expression to some or many of these recessive factors and there is a corresponding decrease in vigour and yield. Cross fertilisation or fertilisation between widely-related plants in a variety is not as likely to bring these recessive factors together, but on the other hand allows of the expression of dominant factors from both parents, and so may increase the number of favourable growth factors with a resulting increase in vigour and yield. In the ordinary variety of maize the vigour and yield is thus maintained or increased.

The practical bearing and application of these facts are important, and must be understood by anyone who is undertaking the improvement of maize. The only practical method of maize improvement which can be carried out successfully by the average farmer is that of simple mass selection. A variety can gradually be adapted to its environment by this means, and improvement made by the elimination of undesirable types. Progress is somewhat slow, but nevertheless sure. The type of the variety may even be and has been somewhat modified by careful attention and selection by some farmers in New South Wales in this way.

#### The Effect of Ear Characters on Yield.

Many and varied are the opinions of farmers as to what constitutes a good seed ear. Such characters as round butts, well-filled tips, straight and regular rows, uniform grain, depth of grain and smallness of core have been over-emphasised by some agricultural shows to the detriment of more important characters.

Since the ear-to-row breeding work was commenced in 1914, data have been collected on all seed ears in the varieties Leaming and Fitzroy at Grafton Experiment Farm. This has given an opportunity of determining the relation of such seed characters to yield. It has been conclusively proved that none of these characters bears a direct relation to yield. In other words, it has been shown that ears with well-filled tips are no more valuable as seed ears (that is, the resulting crop from such seed will not yield any heavier a crop) than ears with tips not so well filled.

Many other characters within the limits of the variety have been overestimated as is shown by the following table of average yields over periods of five to seven years:—

			Yield per	acre.		
Cha	number of rows				Leaming.	Fitzroy
Thick ears Thin ears	•••	•••	•••		bus. 58·5 58·5	bus. 71.7 70.8
	of rows		•••		55·9 58·5	72·2 70·3
Heavy cores Light cores	***		•••		57·8 59·1	70·3 70·4
Small grain Large grain	***	•••	•••	::	70·1 71·4	58-2 59-3
High shelling p Low shelling pe	ercenta; ercentag	ge je	***	:::	58·8 58·0	68·3 71·6
Large cores Small cores	•••	•••		:::	53·5 55·3	71·5 68·0
Well-filled ears Poorly-filled ea		•••			57·9 58·4	. 69·8 71·1

It has been concluded that the slight differences in yield are not sufficient to be of any significance in indicating that these characters of seed ears have any direct bearing on yield. It must be remembered that in this we have been dealing with hybrid seed, and if any character had any influence on or relation to yield, it would necessarily be highly prepotent for its continued expression and definitely linked with favourable growth factors. This is probably too much to expect, and for this reason it seems inadvisable to attempt to correlate such factors with yield in an ordinary hybrid population such as exists in a variety of maize.

#### Methods of Improvement Available to Farmers.

As already stated, sound, bright, plump, heavy grain on comparatively well-developed ears is the foundation and only essential in the selection of seed maize. There is evidence that very rough, starchy ears are more susceptible to stalk- and root-rot diseases of maize (which no single crop in Australia is considered free from) than the smoother, harder-grained ears. The selection of bright, sound, plump, heavy grain will amply exclude all ears of the former type.

It is a common practice for Australian farmers to select their own seed maize, and as they do not depend on any system of breeding it is essential that they should employ the sound methods of selection indicated as most important.

Until recent years cross fertilisation between the different varieties was very common in Australia, and farmers' crops do not appear to be in danger of too-close breeding limiting the vigour. The only person who

needs caution in this respect is the individual who takes an ear or a few grains away from a show with the idea of working up sufficient seed for his farm in this way.

It must be remembered, however, that there is a limit to the range of type which can be allowed in any variety of maize, for admixtures of colour and size of grain are not desirable in a variety from the standpoint of market requirements, which have become more and more specialised in recent years. Practical considerations also demand uniformity in maturity, size of grain, &c., and the type of the variety which has proved itself suited to local conditions must be preserved to some extent.

Mass selection is the only method of maize improvement open to the average farmer. It is slow, but is of undoubted value in the improvement of a variety which has received little attention and also in maintaining the yield of a variety which has already been improved.

#### Improvement by Plant Breeders.

Other methods of improvement are, however, open to, and are being made use of by, the plant breeder. In New South Wales many farmers are still growing local varieties which have not been subjected to these advanced methods of improvement, but, on the other hand, there are a few varieties to which attention has been given by the Department on its experiment farms, and these varieties have been widely distributed and grown on account of their yielding ability. Fitzroy, Leaming, Wellingrove, Large Red Hogan and Funk's Yellow Dent have a very wide popularity in the respective districts to which each is suited. Improvement methods are still in progress at the experiment farms in New South Wales with these varieties, of which several hundred bushels of seed are distributed (by sale) annually to farmers in different parts of the State. The maize improvement work of the Department thus has a strong practical utility.

The methods employed in this breeding work are briefly discussed below.

#### Ear-to-row Selection.

Breeding maize by ear-to-row selection was initiated in United States of America about thirty years ago. It reached the height of its development there when maize improvement work was commenced by the Department in New South Wales sixteen years ago. This was naturally the method followed at the time.

The fundamental principles of the method are so well known that they require no further description. Many improvements have been made in the method since its commencement, but with all these improvements in America the method is now condemned in that country by the best authoraties as no better than ordinary mass selection. It must, however, be admitted that ear-to-row selection is capable of effecting quicker improvement in an unadapted variety than mass selection, but it is questionable whether the improvement can get any further than that effected by ordinary mass selection.

Under the system as followed in New South Wales ear-to-row selection still appears to be giving good results, and it is not intended to give up this phase of maize improvement until a better practical system is devised. The following important details are considered to be necessary in the method of ear-to-row selection:—(1) Soil variation must be overcome by the use of alternate check rows; (2) seed of uncontrolled male parentage from high yielding rows must not be taken as a basis for multiplication; (3) fresh blood must be introduced into the plot now and again to prevent loss of vigour from too close breeding.

In New South Wales improvements have been made in the original plan of ear-to-row selection as described by Wenholz (1), and from the results obtained there is sufficient justification for continuing the ear-to-row selection method of maize improvement on these lines.

The following table gives the yields obtained when seed from the ear-to-row plot was tested against mass selected seed in the variety Fitzroy at Grafton Experiment Farm:—

				Yield 1	er acre.
		Year.		Ear-to-row.	Mass selected.
1921-2 1923-4 1924-5 1925-6 1926-7 1927-8 1928-9	•••			 bus. 82-58 53-33 75-43 31-61 69-58 64-9 77-2	bus. 72·20 50·93 64·6 30·88 71·91 61·88 73·26
	Ave	erage	•••	 64.94	60.8

The table shows that over a period of seven years the average increase in yield of ear-to-row seed over mass selected seed was 4.1 bushels per acre.

## Crossing Adapted Varieties.

In the light of what has been said regarding hybrid vigour, it would appear that crossing between varieties should afford a means of increasing the yield of maize by hybrid vigour. Crossing between two well-adapted varieties of the same maturity and with the same colour of grain would probably be well worth while, particularly if the cross were made every year so as to obtain a supply of first generation seed, for no great variation in type appears in the first year, though later generations show decrease in vigour. However, the production of hybrid seed is probably too much trouble for the average farmer, and, moreover, there is little or no information available as to what varieties are sufficiently unrelated to result in increased hybrid vigour.

Crossing between strains of the same variety which have been developed by selection in different localities to somewhat different types as previously recommended by Wenholz (1) has been followed with success by some progressive farmers.

#### Self-fertilised Lines.

A more recently developed method of breeding maize is that known as selection in self-fertilised lines. The details of the method have been previously described and it was first commenced in New South Wales at Grafton Experiment Farm in 1923. Some years later the same method was employed in Queensland at Gatton Agricultural College.

Sufficient progress has been made at Grafton to indicate that there is a possibility of securing high-yielding selfed lines which will have a simple practical utility in that such seed can be distributed to farmers and its yield will be maintained. If this is not the case, selfed lines for use in hybrid combination must be produced. At Grafton the stage has been reached where it is proposed to combine fixed lines for testing the productiveness or yield of the combinations, although it is certain that some combinations will in the first generation yield more than the original parent variety. It is rather doubtful how far this system of maize breeding will be of practical utilisation over a wide field of maize production, since farmers will tend to continue growing such maize in subsequent generations when the yield must fall off considerably.

In Canada a method has been evolved recently by Macauley (\*). This method is under test with one variety (Leaming) at Grafton. The principle is that instead of artificial self-fertilisation of individual plants, close pollination between sister plants is allowed to occur naturally in the field. It is claimed by Macauley that by this method more of the favourable growth factors are retained in a single line than is possible by rigid artificial self-fertilisation. It is possible that this method will be a very valuable and practical one in maize improvement.

In the foregoing paper the various methods of maize breeding have been mentioned as being of use to the plant breeder, and mass selection as the only one open to the average farmer. It must be remembered, however, that in all of the methods from that of breeding in self-fertilised lines to that of mass selection, the fundamental basis is the selection of good, sound, heavy grain that is bright in colour and free from disease.

## Summary.

<sup>(1)</sup> Mass selection is the only method of improvement open to the average farmer and his selection should be guided by the quality of kernel rather than the type of ear. Good, sound, bright kernels that are free from disease should be the basis of maize selection.

<sup>(2)</sup> Ear-to-row breeding is worth while provided that—(a) soil variations are overcome by use of check rows; (b) seed of uncontrolled male parentage from high-yielding rows be not taken as a basis for multiplication;

- (c) fresh blood is introduced into the plot now and again to prevent loss of vigour.
- (2) An increase of 4 bushels per acre was obtained by the use of ear-to-row seed over mass selected seed.
- (4) Selfed lines have been fixed at Grafton and are now ready for recombination. The practical utilisation of this method must be further tested.
- (5) Macauley's method of natural close pollination offers much promise as a method of maize improvement.

#### LITERATURE CITED.

- (1) WENHOLZ, H.—Practical Methods of Maize Improvement. Agric. Gazette of N.S.W. October, 1923.
- (2) MACAULEY.—The Improvement of Corn. Jour. Hered., Feb., 1928.

#### INFECTIOUS DISEASES REPORTED IN JULY.

The following outbreaks of the more important infectious diseases were reported during the month of July, 1930 —

Anthrax						Nil.
	•••			••		
Blackleg				•••		6
Piroplasmosis (tick feve	er) .					Nil.
Pleuro-pneumonia conta	agiosa					4
Swine fever	• • •	,				Nil.
Contagious pneumonia	***	•••	•••		•••	.2

-MAX HENRY, Chief Veterinary Surgeon.

# FITZROY SEED MAIZE CONTEST AT GRAFTON EXPERIMENT FARM.

A SEED maize contest to encourage the growing of the variety Fitzroy will again be conducted by the Department of Agriculture at Grafton Experiment Farm during this season. The test takes the form of a yield test, and growers are invited to submit 5 lb. samples of seed, which will be grown under uniform conditions, and a certificate of merit will be awarded the owner of the highest-yielding sample.

It will be necessary to limit the number of competitors to about twentyfive, and the Department also reserves the right of refusing any sample not sufficiently pure or true to type, which precaution is necessary in order to safeguard the purity of the seed at the farm.

These tests have proved of considerable value in improving the yielding qualities of maize, as well as creating a demand for seed, particularly from those farmers who are successful in these contests.

Samples of seed should be addressed to the Manager, Experiment Farm, Grafton, while further information concerning the contest can be had from the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney, or from the Farm Manager.

#### TUMUT SEED MAIZE CONTEST, 1929-30.

Mr. L. S. Harrison, Special Agricultural Instructor, in forwarding the results of the Tumut P.A. & H. Society's seed maize competition, draws particular attention to the value of these contests in determining the most suitable varieties for the district. While it is not possible to arrive at any definite conclusions until the trial has been running for at least three years, the results obtained last year are considered interesting enough to warrant publication:—

	(C. C.	(G. C. Camp- bell).		Plains on and vis).	(C. W.	nalac (: nip- ll).	Average.	
	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
1. Funk's Yellow Dent (Dept. Agriculture).	80	33	75	15	94	14	83	21
2. Golden Surprise (C. W. Campbell).	68	· 2	84	53	73	15	7.5	24
2. Mastodon type (V. M. Anderson).	76	14	81	0	69	0	<b>7</b> 5	24
4. Kennedy (Dept. Agriculture)	57	9	78	32	64	38	66	45
5. Early Clarence (Butler Bros.)	63	10	70	16	60	12	64	31
<ol><li>Murrumbidgee White (Brown and Davis).</li></ol>	62	28	59	8	58	17	59	55
7. Murrumbidgee White (C. W. Campbell).	55	45	54	48	63	24	58	2
8. Iowa Silvermine (Dept. Agriculture).	42	35	50	34	51	52	48	22

The yield of Funk's Yellow Dent, a non-competitive entry by the Department of Agriculture, was outstanding, and this variety must always be considered amongst those suited to the locality. Golden Surprise, which tied for first place in the competitive entries, showed up well, but was somewhat variable in type. Mr. V. M. Anderson's entry, which tied with Golden Surprise, was of a very mixed character and showed great variation. As regards the individual entries, it is noticeable that the yields were fairly uniform, no abnormally high or low yields being recorded.

## THE DEVELOPMENT OF MALLEE AREAS FOR SHEEP-RAISING.

It is perhaps of interest to observe that in the older settled areas of Australia the pastoral industry pioneered the wheat industry. First, the open savannah areas were ringbarked and converted into pastoral holdings. Then with the pressure of population the pastoral areas in regions of good rainfall were subdivided for wheat-growing. In the mallee areas this normal procedure is reversed, for mallee lands are most profitably converted to useful purposes by removing the dense vegetative cover, and growing wheat until the ubiquitous mallee shoots are subjugated. A dense sheep population in the mallee areas becomes possibly only when the wheat-grower has more or less completed his work of removing the vegetative cover.—A. E. V. RICHARDSON, in the Journal of Agriculture, South Australia.

# Mallee Farming.

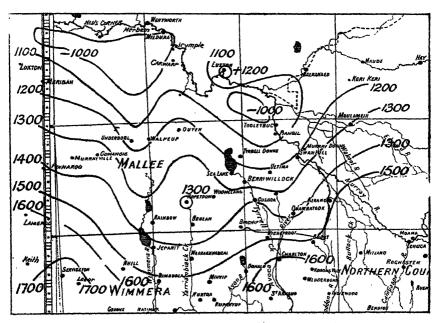
[Continued from page 588.]

E. S. CLAYTON, H.D.A., Senior Experimentalist.

#### RAINFALL OF THE ROTO MALLEE AREA.

One of the most important factors to be considered in determining the suitability of a district for wheat-growing is the rainfall. It is not sufficient merely to consider the average annual rainfall, nor is it satisfactory to consider only the average rainfall in the growing period (April to October inclusive). Averages can be very deceptive and really give no accurate indication of the number of years likely to be experienced when the rainfall will be adequate for wheat production. The average, for instance, may be made up of an equal number of years of very high and very low rainfall, in which case there would be as many failures as successes and the district would be unsuitable.

The investigator really wants to know the reliability as well as the amount of rain. He can gain some idea of this by studying the monthly falls for each year over a period of years, but this is a cumbersome method and does not permit of ready comparison of one district with another.



Map 1.—Median Rainfall for the year above and below which there will be an equal number of occurrences.

The following information gives an accurate indication of the amount and reliability of the rainfall at Roto and Mount Hope in comparison with selected stations in South Australia and Western Australia. If these figures are considered, together with the accompanying rainfall maps of Victoria, a comparison of the amount and reliability of the rainfall of the mallee areas of the three states can be made.

RISK of Low Rainfall at Selected Mallee Area Stations.

Station.	Median Rainfall (above and below which there will be an equal number of occurrences)	The number of points below which the Rainfall drops once in three years.	The number of points below which the Rainfall drops once in five years.	The number of points below which the Rainfall drops once in seven years.	The number of points below which the Rainfall drops once in ten years.
Mount Hope, N.S.W	points.	points.	points.	points.	points.
April-October	865	730	610	540	480
Annual	1,380	1,180	1,000	900	805
Lake Cargelligo, N.S.V		1,100	2,000	•••	000
April-October	870	750	640	580	520
Annual	1,330	1,125	1,000	930	880
Hillston, N.S.W.—	1,000	1,5220	1,000	000	000
A 17 (A . ) 1	940	800	675	600	540
A	1,315	1,120	940	830	745
Roto, N.S.W	1,010	1,120	010		
April-October	840	715	600	530	470
Annual	1,375	1,170	980	870	775
Minnipa, S.A.—	, ,	, -,	,		,,,
April-October	980	. 860	750	698	650
Annual	1.300	1,130	1.000	930	875
Wongan Hills E. Elsin		,	-,		
ton Farm, W.A					
Annel October	1,300	1,140	980	890	815
A	1,580	1,380	1,218	1,116	1,024
Ajana, W.A		,500		_,	-,
A	1,112	1,000	895	825	772
Annual	1,300	1,177	1,056	986	937
	1	-		1	

NOTE.—This information was supplied by the Commonwealth Bureau of Meteorology.

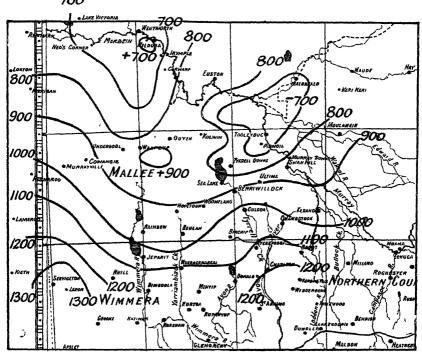
When these figures are interpreted and compared with the maps of Victoria\* (Maps 1 to 4), they offer the best possible means of gauging the wheat-growing possibilities so far as rainfall is concerned. They indicate the amount of rain likely to be received in normal years, also the number of points above which the rainfall will be in two years out of three. The same particulars are given for five, seven, and ten-year periods. The ten-year period figures indicate just how severe the worst drought years will probably be.

If Map No. 1 (of Victoria) is studied it will be seen that all the New South Wales stations mentioned in the above table have a considerable advantage over the north-western Victorian mallee in the matter of annual rainfall. The median annual rainfall at Roto is 1,375 points, which is on a par with such proved and successful districts as Murrayville, Woomelang, and Swan Hill.

<sup>\*</sup>We are indebted to the Commonwealth Bureau of Meteorology for these maps, which were prepared by Mr. H. Barkley.

In the matter of median rainfall for the growing period (April-October inclusive) Roto has 840 points, which is on a par with Ouyen and Swan Hill in Victoria, and is a little better than Loxton, in South Australia, and Hattah, Manangatang, Anneullo and Piangil, in Victoria, and 140 points better than Balranald, in New South Wales.

So far as the number of points below which the annual rainfall will fall once in three years, the Roto area has a big advantage over the extreme north-west of Victoria, but the annual rainfall, of course, is not so important in our study as the growing period (April-October inclusive) rainfall, and



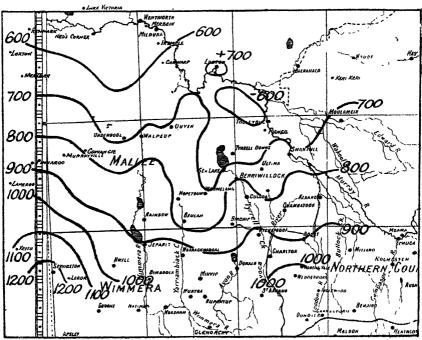
Map 2 .-- Median Rainfall for April-October above and below which there will be an equal number of occurrences.

on comparing these (see Map 3), it will be found that Roto is on a par in this respect with such districts in the Victorian mallee as Underbool, Walpeup, Ouyen, Woomelang, and Swan Hill, and slightly better than Piangil and Hattah, and considerably more favoured than Loxton, in South Australia, and Willah, Carwarp, Manangatang, and Annuello, in Victoria, and Balranald, in New South Wales.

Map 4 shows the growing period rainfalls in the five-year periods. Roto again has the advantage over the extreme north-west of Victoria, and is on a par with Cowangie, Hattah, Kulwin, Ouyen, Murray Downs, and Swan Hill, and being on the 600-point isohyet it is almost as favourably situated in this respect as Beulah, which is a particularly successful mallee district.

## The Suitability of the Roto Mallee Area.

In general these rainfall reliability figures show the Roto mallee area in New South Wales to be more favoured than the doubtful mallee areas newly-settled in the north-west of Victoria. Actually the data show the New South Wales area to be practically as favoured, so far as amount and reliability of rainfall are concerned, as such successful Victorian wheat-growing districts as Ouyen and Swan Hill, and slightly better than Annuello and Piangil, in Victoria, and Loxton, in South Australia. Ouyen and Swan Hill are recognised as quite good wheat districts; most



Map 3.—Number of points below which the April-October rainfall will fall once in three years.

the farmers have been successful as a result of the satisfactory crops they can grow in these districts, so that we can take it that the rainfall must be adequate for the profitable production of wheat.

In the rainfall comparisons I have taken Roto, which is on the extreme western edge of this mallee area, and therefore it is the driest and probably the least favoured portion of that area. Every other portion of this block of 750,000 acres of mallee would be at least as favoured as this station, and the majority of it would be more favoured. This was purposely done to show what the least-favoured part of the area actually receives.

# A Discussion of Rainfall Dissipating Agencies.

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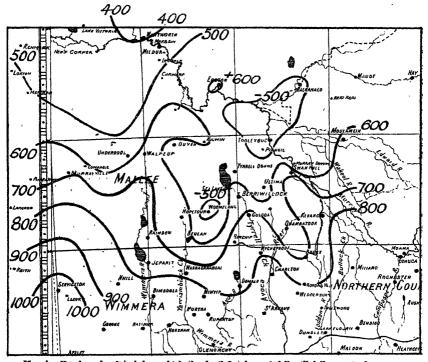
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In New South Wales the weather in the winter months is generally mild and, except in drought years, the atmospheric humidity is not unduly low; therefore in normal years the winter growth is satisfactory. The weather in the spring and early summer months, however, leaves much to be desired. The mild winter conditions are too quickly replaced by rising temperatures, frequent drying winds, and dry atmospheric conditions, which, occurring at this critical period in the growth of the crop, exert a limiting influence on yields. As growth and transpiration are at a maximum at this time of the year, it is only in seasons when, in addition to the precipitation of sufficient late autumn, winter, and springs rains, the spring and early summer atmospheric conditions are favourable, that high yields are obtained. When the spring climatic conditions are protracted and



Map 4.-Number of points below which the April-October rainfall will fall once in five years.

there is no sudden onslaught of summer with its attendant high temperatures, dry winds and excessive evaporation, very heavy yields are sometimes produced in semi-arid districts, and even when the winter rains have been a little less than desirable, it sometimes happens that quite good yields are obtained when the spring conditions are very favourable.

In considering the suitability for cultivation of land in dry areas, the atmospheric conditions of humidity, evaporation, temperature, wind frequency and velocity must also be considered, in addition to rainfall

reliability and soil conditions. Unfortunately it is not always possible to get detailed information regarding all these factors. It is obvious that after taking into consideration all the meteorological information available, it is still necessary to depend on the judgment, borne of experience, of practical agriculturists.

Humidity and temperature have a direct bearing on the effectiveness of the rainfall. This, of course, operates against us in Australia, as in those districts with the lowest rainfall we generally have the highest temperatures and the lowest humidity. As our wheat is grown in winter and spring, we, to a great extent, overcome this disability of low humidity and high temperature, but frequently in the spring months with the plants at a critical stage of development these factors operate against the production of high yields.

#### Evaporation.

The evaporation is, of course, greater when humidity is low; high temperatures also increase evaporation. Another equally important factor is the velocity and frequency of winds. Winds damage a crop by beating it down or by shattering grain in ripe crops, but generally their most undesirable feature is that they greatly increase evaporation. They evaporate moisture from the soil itself, but, worst of all, they greatly increase the plant transpiration rate and may make it impossible for the plant to maintain its water balance, and wilting results. Hot, dry winds at the flowering stage are most injurious and may cause the formation of sterile heads. The combination of high temperature, dry atmosphere, and high wind is very objectionable and causes a heavy loss of moisture from the soil. Unfortunately it is a combination which we sometimes get in the dry wheat districts. The effect of dry seasons is increased by the operation of these additional factors, for generally not only do we in a drought fail to get satisfactory falls of rain, but, in addition, evaporation is increased by the factors mentioned. This question of evaporation is particularly important, but unfortunately very little attention has been paid to it in the past and there is very little information available on the subject. Even the Commonwealth Bureau of Meteorology has very meagre information to give concerning evaporation. Figures are only available for very few contres, probably on account of the difficulties of operation at country centres. The information available indicates that, to some extent, centres away from the coast with equal annual rainfalls have approximately the same annual rate of evaporation.

The evaporation in Western Australia, however, appears to be rather high compared with that in New South Wales. At Perth the annual evaporation from an exposed water surface is 65.84 inches, at Chapman 78.57 inches, and at Merredin, which is well within the wheat belt, it is 39 inches. This district could be compared with Griffith, in New South Vales, from a wheat-growing point of view, but at the latter the annual vaporation is only 63.52 inches. At Coonamble, in New South Wales, it

is 80.29 inches, but other factors seem to operate at this centre (for instance, the wind is rather severe). As the number of centres with available evaporation figures is strictly limited, it is difficult to obtain information regarding comparable districts, but from the foregoing it can be seen that the wheat country of Western Australia has a higher rate of evaporation than that of New South Wales, which is a disadvantage to Western Australia, especially as the spring rains in that State are by no means reliable. It means that to grow wheat successfully the farmers have to depend on early maturing varieties (except in their most favoured districts), so that the crops will be matured before the extreme dryness, combined with the heat of summer, unduly depresses the yield.

The question of evaporation could profitably be investigated further in Australia. It has been said by a competent authority that in the Great Plains area of the United States, which is a semi-arid area, evaporation is at least as important as rainfall. We must realise that the amount of moisture left in the soil at the actual time the plant needs it is the all important factor; it is more important than the amount of rain that falls. The latter is more easily obtained than data regarding soil moisture; therefore it alone has been availed of in Australia, although the importance of the latter has been appreciated. The necessity for information of this nature has been exercising the minds of agriculturists in other countries. We in Australia probably stand more in need of it, and it is a field of investigation which offers possibilities that should not be left unexplored.

It has been shown that just those factors which reduce soil moisture (high temperatures, dry atmosphere, and winds) by causing such prefuse transpiration, actually raise the moisture requirements of the plants. This explains why it is possible in areas well away from the tropic zones to grow crops on rainfalls that in warmer regions would be quite inadequate. In zones well away from the equator an annual rainfall of 10 inches is, under certain circumstances, sufficient to produce excellent wheat crops. South Australia, Western Australia, and Victoria all grow wheat in areas with as low a rainfall as this, yet it has been stated that in the Sahara Desert there are large areas with an annual rainfall of 31.5 to 35.4 inches, yet it is quite impossible to engage in agriculture. This is chiefly due to the high temperature, high evaporation, and greatly raised moisture requirements of the plants.

(To be continued.)

#### A FREE ILLUSTRATED LEAFLET ON WEEDS.

A PAMPHLET entitled "Weeds on the Farm" has just been issued by the Department of Agriculture, and readers are invited to apply to the Under Secretary, Box 36A, G.P.O., Sydney, for a copy. The worst weeds in the State are illustrated and described in this pamphlet, and the most effective methods of control are given.

Farm Forestry.

# V. THE NATIVE AND INTRODUCED TREES OF NEW SOUTH WALES.

[Continued from page 528.]

R. H. ANDERSON, B.Sc.Agr., Assistant Botanist, Botanic Gardens, Sydney, and Lecturer in Forestry, University of Sydney.

#### THE COASTAL DIVISION—continued.

#### Native Trees of the Coastal Division-continued.

Cryptocarya spp.

Some nine species of *Cryptocarya* are found in the Coastal Division. They are essentially brush trees, varying in size from quite small trees to large imposing species. Little is known of the commercial value of their timber, but, speaking generally, it is regarded as fairly easily worked, moderately light, and useful for indoor work, but not very durable for other purposes. The timber of one or two species is said to be fairly strong, tough, and durable, but reliable information is singularly lacking in regard to this group of trees.

Botanically they are characterised by having entire alternate leaves, small flowers arranged in panicles or racemes, the flowers being without petals, and their outer part (perianth) divided into six segments, and by the somewhat succulent one-seeded fruits. The fruits are usually black in colour when ripe, and are from ½ to ¾ inch in diameter. The various parts of the tree are usually more or less aromatic.

Perhaps the two most common species in this State are Cryptocarya glaucescens and Cryptocarya microneura, both of which are to be found, sometimes intermingled, in brush land from about Milton in the southern subdivision northwards to Queensland.

Crytocarya glaucescens is sometimes known as Brown Beech or Native Laurel, and has a moderately soft, pale-coloured timber, which has been suggested as suitable for panelling.

Crytocarya microneura is distinguished from its associated species by having a somewhat pointed fruit (that of Cryptocarya glaucescens is round and somewhat flattened) and by the absence of glaucousness.

The other species of Cryptocarya may briefly be referred to as follows:—
Cryptocarya obovata, known variously as She Beech, Pepperberry tree, and White Walnut occurs as a fine bushy-headed tree from Port Stephens northwards. The leaves are usually more or less ask coloured on the underside.

Cryptocarya erythroxylon, the Red-wooded Cryptocarya, forms a fine-looking, straight-growing tree at the extreme north of the Division in the neighbourhood of the Macpherson Ranges. It is distinguished by its pale reddish timber.

Cryptocarya foetida (Stinking Cryptocarya) occurs in one or two parts of the northern subdivision, mainly in the Richmond River district. The flowers possess an offensive odour, but are much visited by bees and other insects.

Cryptocarya australis is known sometimes as Grey Sassafras or Laurel, and is found from the Clarence River northwards. It has bright scarlet fruits and a fairly light, easily worked timber.

Cryptocarya Meissneri and Cryptocarya patentinerris both occur as small to medium sized trees from the Hastings River northwards. The latter is sometimes known as Brown Beech, and has a pale brown, straightgrained, moderately heavy timber.

Cryptocarya triplinervis (Three-veined Cryptocarya) is found in the Richmond and Clarence River districts, and is characterised by the three prominent veins springing from the base of the leaf.

Uses.—The timbers of the various species of Cryptocarya may one day be usefully employed, but at present no commercial use is being made of them. The species are not highly regarded as ornamental or shade trees, and have been very little grown, although one or two of them should form nice umbrageous trees.

#### Endiandra spp.

Six species of *Endiandra* are found in the Coastal Division. They are comparatively unimportant species, but constitute a fairly characteristic portion of some brush areas, and in some cases are worthy of cultivation as ornamental trees.

All the species have alternate, entire leaves, small flowers without petals, and moderately large one-seeded fruits.

The most common species in New South Wales is *Endiandra Sieberi*, which is sometimes known as Corkwood. It is found on moderately good sandy soil not far from the coast from the southern end of the central subdivision northwards. It has a pale brown, rugged, corky bark, which is sometimes used as an inferior substitute for cork. The fruit is blue or purplish, about  $\frac{3}{4}$  to 1 inch long, the thin fleshy covering being a favourite food of some of the native birds. The timber is pale coloured and fissile.

Endiandra virens, sometimes known as White Apple, is found in a number of localities north of the Comboyne. It is a small to medium sized tree, with rather sparse, light green foliage and large yellowish fruits which form in great profusion. It appears to be worthy of consideration as a garden subject.

Endiandra globosa (the Ball Fruit) occurs as a fairly large tree in the Tweed River district. It is characterised by the large and striking ball-like fruits, which are up to 2 inches in diameter.

Endiandra discolor (Tick Wood) occurs from Gosford northwards. It is one of the largest trees in some districts, including Gosford. but its timber does not appear to have been used to any extent.

Two other species, Endiandra Muelleri and Endiandra pubens, are found in a few localities in the northern subdivision.

#### OPOSSUM WOOD (Quintinia Sieberi).

Usually a small bushy tree, but occasionally reaching 70 feet in height, found mainly in the ranges of the Coastal Division from south to north, but extending to portions of the Tablelands. The bark is dark brown and often wrinkled and somewhat corky. The species is interesting, as it frequently begins life on the trunks of tree ferns, where the seed germinates.

"Leaves alternate, coriaceous, elliptical, 3 to 4 inches, entire, fairly strongly veined. Flowers white, about ½ inch diameter, freely produced in panicles at the ends of branchlets. Fruit, a small three to five celled capsule opening at the top, the styles separating up to the stigmas, which remain united."

Uses.—The tree is very free-flowering and has rather handsome leaves, and may be planted for small ornamental purposes. The timber is seldom, if ever, used.

An allied species, Quintinia Verdonii, differs in having yellowish-white flowers in long, narrow axillary racemes. It is found in the northern subdivision as a large shrub or small tree.

## FEATHERWOOD (Polyosma Cunninghamii).

A small tree, rarely exceeding 40 feet in height, found in the central and northern subdivisions from Wollongong northwards. It occurs mainly on the coastal ranges and the lower eastern portions of the Tableland Division.

"Leaves opposite, toothed, 2 to 5 inches long. Flowers white or greenish, very fragrant, in short racemes, the petals cohering in a tube about ½ inch long. Fruit, black, egg-shaped, ½ to ¾ inch long, fluted or ribbed."

Uses.—The timber is pale coloured, fissile, and rather attractively figured, but is little, if at all, used.

## PITTOSPORUM (Pittosporum undulatum).

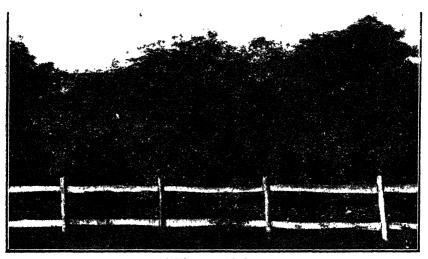
Usually a small bushy tree, although occasionally reaching 80 feet in height, found mainly in gullies in all subdivisions. It is sometimes known as Mock Orange.

"Leaves 3 to 5 inches long, entire, more or less clustered at the end of branchlets or at nodes. Flowers white, fragrant, in compound clusters. Fruit a capsule with thick hard valves, containing ruby coloured seeds."

Uses.—This species is commonly grown for ornamental purposes, and is easily propagated from seed. It makes an effective hedge, and is useful for small windbreaks, although subject to white wax scale and borers. The timber is pale coloured, hard, close-grained, and strong, being considered suitable for carving and engraving and such minor purposes as golf heads and wooden screws.

Two other species of *Pittosporum* are also found in the Coastal Division, viz., *Pittosporum rhombifolium* and *Pittosporum revolutum*. The former occurs as a small to medium sized tree from the Clarence River northwards, and is distinguished by the broader leaves which are toothed along the margin, and by the smaller capsules. Its uses are similar to those of *Pittosporum undulatum*.

Pittosporum revolutum is a small to medium sized shrub, distinguished by its yellow flowers and hairy twigs and leaf under-surfaces.



A Pittosporum Windbreak.

NATIVE FRANGIPANNI (Hymenosporum flavum).

A small tree, in exceptional cases reaching 70 feet in height, found in gullies or on creek banks from the Hunter River to Queensland.

"Leaves alternate, 3 to 5½ inches long. Flowers yellow, fragrant, over 1 inch long, in terminal panicles. Fruit a thick capsule containing numerous flat, winged seeds."

Uses.—This is an ornamental species suitable for garden work or for small shade and shelter purposes. The timber is whitish, close-grained, fairly tough, but easy to work. It is, however, seldom used.

#### RED CARABEEN (Geissois Benthami).

A medium to large sized tree with a smooth grey bark, found in brush country in the northern subdivision from the Manning River northwards.

"Leaves opposite, consisting of three leaflets, the leaflets toothed and up to 6 inches long. Flowers small, without petals, but with numerous stamens, in slender racemes 3 to 6 inches long. Fruiting capsule somewhat woody, almost cylindrical, ½ to ¾ inch long, silky, downy, splitting open when ripe."

Uses.—The timber is bright pink or reddish when freshly cut, but dries paler, is close-grained, easily worked, and although rarely used should be suitable for general indoor work. This species should form an attractive ornamental tree.

#### A CORKWOOD (Ackama paniculata).

A small to moderately large tree found in brush country and the fringes of bushes along the coastal ranges and ridges from the Hawkesbury River to Queensland. It is usually referred to as Corkwood owing to the rather thick corky bark, but is also known as Roseleaf Marara.

"Leaves pinnate, with three to seven leaflets, leaflets elliptical or lanceolate, toothed, 2 to 5 inches long. Flowers very small, in much branched panicles. Capsules under 1-5 inch long, opening in two valves.

Uses.—The inflorescence is soft and graceful, and the species is worthy of cultivation for garden purposes. The timber is close-grained, easily dressed and fairly strong, and should be suitable for cabinet and indoor work.

A closely allied species, Ackama mollis, is found in a number of localities in the northern subdivision, growing fairly freely in open forests and brushy ridges, being often seen on the ridges ascending to the Dorrigo. It is readily distinguished from the above species by having the branchlets and undersides of the leaves densely clothed with brown hairs.

## WHITE CHERRY OR CRAB APPLE (Schizomeria ovata).

A medium to very large sized tree found in brush forests from Illawarra to Queensland, mainly in ridgy or hilly country. The bark is smooth or becomes somewhat rough and corky in older trees, and when freshly stripped has a rather unpleasant odour. It is one of the several trees known as Leather Jacket, and is also occasionally referred to as White Ash.

"Leaves opposite, with toothed margins and distinct venation, 3 to 6 inches long. Flowers small, in much branched inflorescences. Fruit succulent, egg-shaped, about ½ inch long, translucent white or somewhat yellowish, two-seeded."

Uses.—The white or pale coloured timber is fairly soft and open grained, and is not durable except for indoor work. It has been suggested as suitable for fruit and packing cases. It is sometimes substituted for Coachwood, to which it is inferior, although quite useful. The small fruit has few edible qualities, but is said to relieve thirst amongst bush workers. The tree is ornamental and of use for shelter work.

## COACHWOOD (Ceratopetalum apetalum).

A medium-sized, straight-growing tree, with a smooth greyish bark which is traggant when broken. It is a brush species commonly found in gullies

from Milton in the southern subdivision northwards to Queensland, and extends to the Tableland Division in parts. It is one of the several trees known as Leather Jacket.

"Leaves opposite, strongly veined, toothed, 2½ to 5 inches long. Flowers inconspicuous, without petals, but the calyx-lobes enlarge and turn red or purplish after flowering. Fruit small, dry, hard, two-celled, surrounded at the base by the wing-like calyx-lobes."

Uses.—The pale pink, faintly perfumed timber is fairly light, easily worked, strong, seasons well, and is most useful for any purpose requiring a strong, fairly light timber. It is used for tool handles, coachbuilding furniture, gunstocks, the wooden parts of agricultural machinery, and has been frequently and successfully used for making fruit cases. The tree forms a shapely garden specimen, having handsome foliage, and is well worth growing in somewhat sheltered and moist situations. It is readily propagated from seed.

The Christmas Bush (Ceratopetalum gummiferum) so widely cultivated and admired as a garden shrub, is a closely allied species to the Coachwood.

#### MARARA (Weinmannia lachnocarpa).

A medium to fairly large sized tree, prominently buttressed at the base, found in brush forests northwards from Coff's Harbour. It is also occasionally known as Red Carabeen.

"Leaves opposite, consisting of three somewhat toothed leaflets, each leaflet 2 to 4 inches long. Flowers small, without petals, in slender racemes. Fruit a capsule covered with dense long hairs, forming a hairy ball about \(\frac{1}{2}\) to \(\frac{1}{2}\) inch diameter."

Uses.—The timber is red when freshly cut, but dries a dirty pink. It is moderately hard, easily worked, and has little figure, and is said to be suitable for general indoor work and for tool handles, mallets, and other tools.

An allied species, Weinmannia rubifolia, occurs usually as a small tree in brush lands from the Hunter River northwards. It is distinguished from the above species by the comparative absence of hairs on the fruits, and by the leaflets being densely hairy along the veins on the under-surface. This species also superficially resembles the Corkwood (Ackuma paniculata).

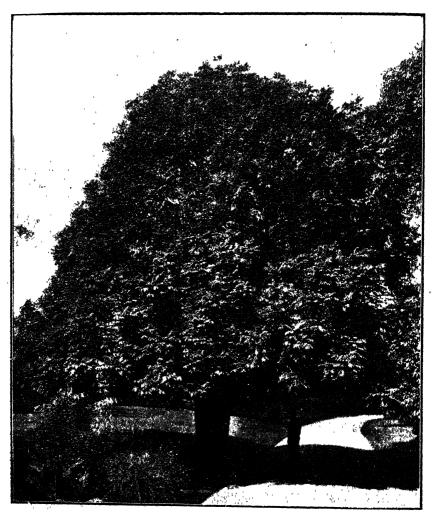
#### Callicoma (Callicoma serratifolia).

A brushy shrub or small tree with brownish bark, occasionally reaching 40 feet in height, found in all three subdivisions, from the Sugarloaf Mountain in the Braidwood district northwards to Queensland. It occurs almost invariably in damp soil, especially in the vicinity of creeks. The early settlers used the wood for making the wattle and daub houses of the period, and to them it was widely known as Black Wattle. This name, however, is now only applied to one or two species of Acacia.

"Leaves 2 to 5 inches long, opposite, glabrous on the upper surface, densely hairy underneath, the margins regularly toothed. Branchlets densely rusty hairy. Flowers small, forming dense globular heads ½ to ¾ inch diameter,

the heads borne on long stalks. Fruit consists of two small hairy carpels opening along the inner edge."

Uses.—The timber is pinkish, close-grained, and easily worked, but is rarely large enough to be used for commercial purposes.



Black Bean or Moreton Bay Chestnut (Castanospermum australe).

BLACK BRAN OR MORETON BAY CHESTNUT (Castanospermum australe).

A medium to large sized tree up to 130 feet in height, found mainly in moist alluvial soil, frequently along streams in brush forests in the northern subdivision from the Bellinger River to Queensland.

"Leaves dark green, pinnate, up to 2 inches long, consisting of eight to eleven leaflets, each leaflet 2 to 5 inches long. Flowers in racemes on last year's wood, pea-like, 1 to 1½ inches long, yellowish to red. Pod hard, heavy, 6 to 10 inches long, containing large brown seeds.

Uses.—The tree is most ornamental, and is frequently preserved when clearing operations are being carried out. It makes a good shelter and shade tree on rich or moderately rich soils. The pods are generally reputed as poisonous to stock, causing gastro enteritis, and a saponin has been found in the leaves. The dark-brown timber is easily dressed, polishes well, and has an extremely handsome figure, making an excellent cabinet wood of the heavy class. It is, however, rather difficult to season, and the white sapwood is often very wide. The sapwood is also very liable to borer attack.

#### Pithecolobium spp.

These species are characterised by having bipinnate leaves, flowers clustered in stalked heads, and by the twisted pods when ripe. Thy are found scattered through the brush forests, and make beautiful ornamental trees and small shade trees. The timber is of no commercial importance.

Pithecolobium grandiflorum is known sometimes as Marble Wood or Lace-flower tree, and occurs in the northern subdivision as far south as the Hastings River. It is usually a small tree, but occasionally reaches 50 feet in height, and has crimson-tipped flowers which have a fine fragrance, especially at evening time, somewhat like the Honeysuckle. It flowers as a shrub, and makes a very attractive plant.

Pithecolobium pruinosum is known as Snow Wood or Stinkwood, the latter name being due to the disagreeable odour of the freshly-cut wood. It occurs as a shrub or small tree from the Shoalhaven River northwards to Queensland, and forms a fine ornamental garden plant.

Two other species, Pithecolobium Hendersoni and Pithecolobium Muelleriana, are also found in the northern subdivision.

#### BREWSTER'S CASSIA (Cassia Brewsteri).

A small handsome tree, occasionally reaching 40 feet or more in height, found in the northern subdivision.

"Leaves pinnate, the leaflets in two to four pairs. Flowers yellow, in long slender racemes. Pod rather thick, up to 12 inches long."

Uses.—This is an ornamental species suitable for garden work or for small shade trees. It is occasionally found in gardens, and is worthy of wider cultivation.

#### Barklya syringifolia.

A small to medium sized tree found comparatively rarely in the northern subdivision from the Richmond River to Queensland. It is a species of moist rich soils in brush country.

"Leaves alternate, heart-shaped or broad at the base. Flowers orange, in dense racemes, forming a large terminal inflorescence, the individual flowers to 1 inch long. Pod 2 to 3 inches long.

Uses.—This is a most ornamental species and well worth cultivating, especially on moderately rich and moist soils. The orange or yellow flowers are borne in great profusion, contrasting finely with the rich dark foliage. The dark-grey timber is hard and close-grained and perhaps suitable for tool handles, but this species is essentially one for ornamental purposes rather than economic uses.

BAT'S WING CORAL TREE (Erythrina vespertilio).

A small to medium sized tree, occasionally reaching 90 feet in height, found in open forest country or drier brush lands from the Clarence River northwards. It is wholly or partially deciduous. The bark is corky and the branches armed with prickles.

"Leaves consist of three leaflets, each of which is deeply two or three lobed, and often broader than long. Flowers bright red, about 1½ inches long, clustered in axillary racemes. Pods 2 to 4 inches long, tapering at both ends, containing several large red or yellow seeds."

*Uses.*—This species is moderately useful as a small deciduous shade tree, and might also be grown for ornamental purposes.

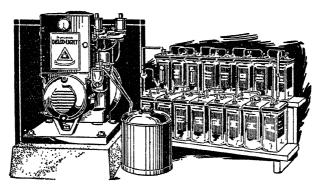
Several other Coral Trees are grown in this State. One, Erythrina indica, is found naturally at one or two places in the northern subdivision and in Queensland, but is little, if at all, cultivated. It resembles the common Coral Tree (Erythrina corallodendron) in general features, but differs in having larger seeds which are brown or dark coloured, as compared with the smaller red seeds of the latter species. Erythrina corallodendron is an introduced species, and will be described when the introduced trees of the Coastal Division are being dealt with.

(To be continued.)

# ALL-THE-YEAR-ROUND IS PROVING A POPULAR LETTUCE VARIETY.

ALL-THE-YEAR-ROUND has proved to be an excellent type of lettuce in the Bathurst district, and now advice is to hand of very satisfactory results having been obtained on the South Coast. Mr. E. W. Buckland, of Helensburgh, tried out the variety last year and found it to be an excellent summer lettuce. It hearted well and grew to a good size. Being a yellow lettuce, however, it was not favoured in the winter months, when the green types were usually in good supply. He found All-the-Year-Round sold well in the summer, when the green lettuce was difficult to get to heart and was apt to go to seed.

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# Vine Topping Trials.

H. L. MANUEL, Viticultural Expert.

Owing to its having been suggested that topping of vines was likely to increase the sugar content of the particular vines so treated, tests were carried out in the years 1928-1929 and 1929-1930 to ascertain if any increase took place.

In the season 1928-29 tests were carried out on Grenache and Black Shiraz, and Mr. N. D. Lackie, Superintendent of the Viticultural Nursery, Griffith, has submitted the following results:—The vines were topped on 12th December, 1928, but the Black Shiraz vines had previously been rolled on the trellis and were only lightly topped.

The Baumé tests of the topped and check (untreated) vines were as follows:—

BAUME Tests of Topped and Untreated Vines, 1928-29.

Grena	che.		Black Shiraz.						
Topped Plots. Check Plots.				Topped Plots. Check 1					
Test.	Plot.	Test.	Plot.	Test.	Plot.	Test.			
12.7	2	14.5	1	14.5	2	14.2			
13.0	4	14.0	3	14.8	4	14.7			
12.8	6	13-5	5	14.8	6	15.0			
	Test. 12·7	Test. Plot.  12.7 2  13.0 4	Check Plots.	Test.         Plot.         Test.         Plot.           12.7         2         14.5         1           13.0         4         14.0         3	red Plots.         Check Plots.         Topped Plots.           Test.         Plot.         Test.         Plot.         Test.           12·7         2         14·5         1         14·5           13·0         4         14·0         3         14·8	ed Plots.         Check Plots.         Topped Plots.         Check           Test.         Plot.         Test.         Plot.         Test.         Plot.           12·7         2         14·5         1         14·5         2           13·0         4         14·0         3         14·8         4			

The Grenache vines showed a marked decrease in density of the fruit as a result of topping, and the even densities obtained from the topped and untreated (check) plots in the Shiraz vines might be accounted for by the fact that a number of canes could not be topped as the result of having been rolled on the trellis.

In the year 1930, an additional plot of Black Shiraz was included, and these vines were topped prior to the flowering period. The plots were triplicated, and the following sugar tests were taken during vintage:—

BAUME Tests of Topped and Untreated Vines, 1929-30.

Gre	mache (T	est, 7-	i–30) <b>.</b>			Blac	ek Shiraz	(Test 1	9-3-30).		
	Topped 11-29).	Chec	k Plots,	Plots Topped (9-10-29).		Check Plots		Plots Topped (2-11-29).		Check P.ots	
Plot.	Test.	Plot.	Test.	Plot.	Test.	Plot.	Test.	Plot.	Test.	Plot.	Test.
1	15.3	2	16-4	1	14.8	2	14.8	1	15-0	2	15.3
3	15.5	4	16.0	3	14.5	4	15.2	3	14.8	.4	15.1
5	16-0	6.	15-8	5	14.9	6	15.0	5	15-0	6	14-8

#### Conclusions.

Topping appears to have little or no effect on Black Shiraz, and the Grenache have shown a slight decrease in sugar in the topped plots as compared with untreated check vines.

So far as these trials are concerned the results do not substantiate the claims that topping has resulted in a beneficial increase in the sugar strength.

## Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36A, G.P.O., Sydney, not later than the 12th of the month.

```
Maize-
  Fitzroy
                          ... Manager, Experiment Farm, Grafton.
   Large Goldmine ...
                          ... P. Short, "Moore Park," Armidale.
   Leaming ...
                          ... Manager, Experiment Farm, Grafton.
Broom Millet ...
                          ... Under Secretary, Department of Agriculture, Box 36A.
                                 G.P.O., Sydney.
 Lucerne Seed ...
                          ... W. J. Scott, Allengrove, Baerami Creek, via Donman'
Sorghum-
   Sumac
                          ... Manager, Experiment Farm, Bathurst.
   White African ...
                          ... Manager, Experiment Farm, Wollongbar.
 Onions-
   Improved Hunter River
       Brown Spanish ... S. Redgrove, "Sandhills," Branxton.
   Early Hunter River White S. Redgrove, "Sandhills," Branxton.
   Hunter
           River Brown
       Spanish
                          ... C. J. Roweliffe, Old Dubbo Road, Dubbo.
Tomatoes-
   Bonny Best ...
                          ... Manager, Experiment Farm, Bathurst.
   Chalk's Early Jewel
                          ... Manager, Experiment Farm, Bathurst.
 Watermelon-
   Angelino ...
                          ... C. J. Roweliffe, Old Dubbo Road, Dubbo.
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A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

## Orchard Notes.

SEPTEMBER.

#### C. G. SAVAGE and R. J. BENTON.

For some weeks there have been indications that the season will be an unusually early one. Though weather conditions may quickly change, resulting in late frosts which will retard development, cultural and fertilising practices should be advanced in keeping with the anticipated early season.

Weather conditions are often very erratic—seasons of abundant rainfall may be followed by long dry periods, which may be accompanied by much wind. Such conditions combined with heavy weed growth very quickly deplete the soil of a large quantity of moisture. As suggested in last month's Notes the general ploughing of the orchard should by now be completed, but probably the squares surrounding each tree still remain to be worked. This operation is very important in the case of young trees and also of old trees where herbage is growing, particularly in non-irrigated areas. Even in irrigated areas the suppression of weeds and the breaking up of the soil are recommended, for they assist in more even penetration of water and better aeration. A pronged hoe or a specially-shaped long-handled shovel is the most useful tool for this work.

#### Fertilising Citrus Trees.

A definite fertilising programme is necessary for citrus growers, and many experiments in all the citrus growing districts have indicated the value of nitrogenous fertilisers. Market returns during the present season have been distinctly disappointing to growers, and consequently the necessity for more economical production is obvious. Apart from more thorough cultivation, possibly by the use of better implements, there is no practice which is more profitable than the correct use of fertilisers. For citrus growing purposes every soil requires extra nitrogen to assist the trees to set their crops and for wood development for future crop production. The oft-expressed opinions that highly concentrated nitrogenous fertilisers are merely stimulants and that the soil is impoverished by their use are rapidly being disproved.

Many growers will have already made the spring applications of fertiliser and where this has not included a considerable amount of nitrogen, a nitrogenous fertiliser should immediately be applied to bearing trees. In the purchase of fertilisers, growers are warned not to be guided only by the price, but to take into consideration the plant-food content, for instance, the percentages of nitrogen, phosphoric acid, and potash they contain. A leaflet on fertilising citrus trees is available on application to the Under Secretary.

#### Planting Citrus.

For most districts it is recommended that any planting of citrus trees yet to be done be expedited. On receipt of the trees it will usually be noticed that large, medium and possibly some small trees have been included. Usually such trees develop for some years in keeping with their size, consequently grading is recommended, all the small trees being planted in a row so that special attention can be given them to encourage increased growth.

Defoliating the trees by cutting off the leaves at planting will reduce transpiration and assist in a more rapid re-establishment. The leaves will frequently fall off some days after planting, but cutting off is more desirable. Some protection to the bare stem is necessary, for sun and wind are likely to harden the bark. Several folds of newspaper loosely tied appear to offer the best protection.

#### Reworking of Unsuitable Varieties.

September is an opportune time for grafting unsuitable deciduous fruits, but unsatisfactory citrus varieties are best reworked by budding into young shoots forced out as a result of reheading the tree. This reheading or severe cutting back may now be carried out, and where the trees are not vigorous, fertiliser should be applied to them. This is contrary to the usual practice, but is necessary because when weak trees are cut back severely much sunburning and dying back result. The trees to be reworked must be of good vitality for the operation to be successful. White-washing the reheaded trees is helpful in mitigating bark injury.

#### Pruning.

Whenever time permits, the removal of dead and spent wood from orange trees should be continued. In the case of young trees careful and continued vigilance is necessary to cut out cleanly any vigorous shoots arising near the centre of the trees. These, if unsuppressed, develop into limbs which spoil the desired symmetrical rounded shape of the trees and, being in or near the centre, prevent the dead and spent wood being removed as economically as is desirable. Limbs growing along or too near the ground should be removed so as to provide a little clearance above the ground.

#### Citrus Diseases.

Citrus Scab.—Lemon producers are advised to spray for the prevention of this disease when the maximum development of bloom is shedding its petals. A leaflet giving details of the mixtures is obtainable on application to the Department.

Citrus Brown Rot—Mr. W. B. Stokes, Orchard Inspector, draws attention to the fact that this disease, which is caused by the fungus Phytophthora hibernalis, and which has been known for a number of years, has done considerable damage in the Gosford district this winter, owing to the continuous rain experienced during that period. Of course, it does not

follow that a similar outbreak will occur next winter, but growers on lowlying wet land or on areas subject to flood, or who suffered damage this year, would be well advised to keep in mind the recommended control measures. They are: (1) Keep down high weed growth in the orchard, and (2) spray the lower branches thoroughly to about 4 feet above the ground in late autumn next year (about April or May, before the first heavy winter rains), with Bordeaux (6-4-80), plus 1 per cent. spraying oil.

#### Bunchy Top Disease of Bananas.

Mr. H. W. Eastwood, Fruit Instructor, Byron Bay, points out that with the commencement of vigorous growth in the spring "bunchy top" disease of bananas becomes more active. The seasonal conditions have some bearing on the spread of this disease, and it is now recognised that bunchy top is most prevalent during the summer and early autumn and least active during the winter. Although it is imperative to fight this disease all the year round the intensity of the control must be increased as the disease becomes more active.

The most successful control of bunchy top has been obtained where growers have efficiently carried out the control measures recommended. Scores of plantations to-day give practical proof of the effectiveness of the regulations. The aim of each grower should be (1) to detect the disease in its earliest stages, (2) to treat the plant immediately with an insecticide to kill all aphids on the plant, and (3) immediately to dig out the plant and all its dependent suckers, together with the underground parts, and thoroughly destroy them. Thoroughness in all these operations is essential to obtain the best results, and where this procedure is adopted bunchy top is not causing growers much anxiety.

The further precaution is taken by many growers of spraying all stools in the neighbourhood of diseased ones to check the spread of aphis and minimise the risk of further infection. Some growers are now of the opinion that the whole stool should be destroyed where one or more units are affected in the stool. This is a progressive idea and the adoption of the practice will reduce the likelihood of further infection from the same source, as when one plant in a stool is diseased the whole stool must be regarded as diseased.

Unfortunately, infection may occur from outside sources and occasionally odd plants become affected. If this happens it is not the fault of the grower, but when the disease spreads from one stool to another and affects a few stools in the same locality, he may be assured it is spreading from infection within his own plantation, and it is time to recognise that his efforts are not effective in checking the disease. On the other hand, many instances are on record where slight infections of bunchy top have occurred, and concentrated efforts on the part of the growers have stamped them out with no recurrence of that infection.

Prospective growers should make certain they are getting suckers from a clean source of supply and thereby guard against one of the two means of getting bunchy top in their plantations. It is much easier to prevent its

introduction in this way than to cope with it after it has developed. Delay in detecting bunchy top and treating it means more bunchy top from that infection, and the longer the delay the more bunchy top will occur.

A warning is necessary to those over-optimistic growers who have had only a negligible quantity of bunchy top and who believe that the disease is beaten and does not need constant care and attention. Any laxity shown is likely to result in an increase of the disease. A leaflet on bunchy top and its control is procurable from the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

#### A BIG IMPROVEMENT IN WHEAT-GROWING PRACTICES.

REPORTING on the year's operations, Mr. H. C. Stening, Chief Instructor of Agriculture, draws attention to the great improvement that has taken place in wheat-growing methods during recent years, as evidenced by a yield of 33,948,000 bushels last year, which was one of the driest seasons on record. The average yield of 8.7 bushels per acre is a considerable increase on that obtained in previous drought years. For instance, in 1902, the wheat crop was a total failure, while in 1914 it was only 4.7 bushels, and in 1919, 3 bushels per acre.

## WHITE MAIZE COMPETITION, 1930-31.

THE Department of Agriculture is again co-operating this season with local agricultural societies, the Royal Agricultural Society, and Messrs. Kellogg (Aust.) Proprietary Ltd., in the carrying out of maize competitions on the same lines as last year's contests.

As in previous years, Messrs. Kellogg (Aust.) Pty. Ltd. are donating a substantial sum for prize money, amounting this year to £150, or £30 to be divided among the first, second, and third prize winners in each of the five districts into which the State has been divided.

The judging will be undertaken by the Department's district agricultural instructors, and will be carried out at the same time and in conjunction with the field maize competitions conducted by the local agricultural societies in co-operation with the Royal Agricultural Society. The crops entered may be inspected twice by the judge, and points will be awarded for (a) germination and stand, (b) cultivation methods and weed control, (c) condition, appearance, evenness, &c., of the crop, (d) freedom from insect pests and disease, (e) purity and trueness to type, (f) estimated yield, and (g) suitability of maize for manufacturing purposes. Messrs. Kellogg (Aust.) Pty. Ltd. will allot the points under section (g).

Fairies close with the local agricultural societies, and must be made within two months after time of sowing or germination of the crops. In the event of any local society not conducting a competition, individual farmers will be permitted to submit an entry through their district society. Entry forms and detailed particulars can be obtained from the agricultural societies in the districts affected.

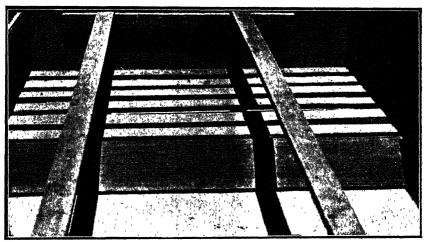
## Poultry Notes.

SEPTEMBER.

#### V. H. BRANN, Acting Poultry Expert.

THE end of this month is quite late enough to hatch further batches of chickens this season. Those who have not hatched as many as desired cannot hope to prolong the season successfully. Apart from the fact that late hatched cockerels do not realise remunerative prices, the poorly developed and slow-maturing late-hatched pullets—with the exception of a few raised under ideal conditions—cannot make up for any deficiency in the numbers of early-raised birds. It would be better to hatch during February and March, but hatching during these months also has limiting factors to be considered.

The hatching of a large number of chicks does not always ensure greater returns. The farmer must look ahead and estimate the number of layers he can adequately accommodate later on. The majority of hens now in



Arrangement of Movable Platform to Induce Chickens to Roost.

The slats are thinned out as the chicks become older.

their third year will not be disposed of till next autumn, and the houses and yards for young stock must be sufficiently large to carry them till that time. It is courting disaster to crowd this class of stock, particularly during the summer months.

#### The Second Stage of Rearing.

Every effort should be made to induce the chickens to roost as soon as they are six weeks old, and have been taken away from the brooders. Heavy losses occur through even well-reared chickens packing into the corners of the house. The method adopted to induce chicks to roost has already been outlined in these notes of last October.

It is not every farmer, however, who is equipped with special rearing pens for this purpose. There is no objection to using the colony house for chickens leaving the brooders, provided that the front of the house is temporarily covered, allowing for only a few inches at the top to permit of ventilation. In many instances also long houses more suitable for layers are used for this purpose. It is not advisable to place a large number of chicks together at this stage—the maximum number recommended is sixty.

Houses of this class should be partitioned every 8 to 10 ten feet, with every second partition of wood, iron, or even sacking, to prevent draughts and winds from sweeping along the house. If there is not a separate yard for each compartment, it is essential to see that the chicks are fairly equally divided between the houses at night. After two or three weeks the covering can be removed from the fronts of the houses if weather conditions are favourable.

There is no mistaking the symptoms due to the effects of chickens packing and "sweating" the houses. They appear ruffled and the majority are dirty in plumage; they are listless, lack appetite, rapidly lose condition, and become completely emaciated before death. It is also common to find outbreaks of acute coccidiosis affecting these chicks, and usually it can be associated with the lowered resistance to disease brought about by the conditions under which the chicks have been kept after leaving the brooder house.

#### The Case for Caponising.

A profitable demand for capons has never been developed in this country. Moreover, as a general commercial practice it cannot be strongly advocated. Early hatched cockerels can be disposed of at a better price than if held, as the market becomes weaker after December. There is little advantage in caponising unless the birds are at least eight months old, and the cost of keeping and feeding is not justified by the higher prices, if any, that might be obtained. There is no questioning as to the superior quality of the flesh, but the capon is not sufficiently known to the Australian public to be appreciated. Another big objection is the necessity to caponise cockerels before their value as breeders can be ascertained.

There is, however, a point in favour of caponising, and it is with regard to cockerels hatched after August. A common practice at the present time is to dispose of the cockerels as soon as the sexes can be identified, at prices which are an economic loss. An organisation which will stabilise the market for late-hatched cockerels has yet to be formed. Farmers who have sufficient accommodation and follow the custom of holding over the cockerels for a firmer market experience considerable losses, due to the birds knocking one another about. The birds also become staggy and the quality of flesh rapidly deteriorates. Thus people who have a private sale for prime table birds or who keep poultry for their own use find it difficult to maintain a supply of first-class table poultry throughout the whole of

the year, and are desirous of knowing something about the capon. Although to recommend caponising as a general practice is not commercially sound, in cases where cockerels are kept longer than necessary for marketing it is better that they improve rather than depreciate. It is because of the few points in its favour and to satisfy the numerous inquiries that the operation is described.

#### Caponising.

The correct age to caponise is from eight to ten weeks old, according to breed and sex development of the individual bird. The best time really is when the comb begins to shoot and the bird is assuming the general characteristics of the male. The testes should be about the size of peas. It is essential to have a set of special instruments for the operation. These consist of a lance or scalpel, spreader, probe, and tractors or twisting scoop to remove the organs. The birds should not be fed or given water for twenty-four hours before the operation, because of the difficulty to operate when the intestines are full of food. A barrel or small table on which the birds placed should be of a convenient height. A bright sunlight day should be chosen, because of the difficulty to see the organs in a poor light. The bird is placed on the table on its side, and to prevent it struggling a cord, to which a weight, say, half a brick, is suspended, is tied round each leg and wing. Another method is to strap the bird's legs and wings directly to the table.

The position in which to make the incision is between the last two ribs, and the feathers on that part should be plucked and the surrounding feathers damped to make them lie flat. The skin should be lightly drawn by the fingers before making the incision, in order to allow the skin to cover the hole in the abdomen when released. The length of the cut should be about 1 inch, with the upper portion of the wound about half an inch from the backbone. Care must be taken not to cut too deeply for fear of cutting the organs. The spreaders are then placed in the wound to permit of a view of the organs and to allow the instruments to be inserted into the abdomen. The air sac walls or membranes are then torn away, and the testes, which are bean-shaped and cream in colour, can be easily seen close to the backbone. In occasional cases, I have seen them almost black.

Each testis is removed by placing it in the scoop and gently twisting till it can be drawn out. The lower testis should be removed first, as any haemorrhage that occurs would obscure the view. To remove the lower testis it will be necessary also to cut through the mesentery, or web-like membrane, attached to the vertebrae and supporting the viscera. As a matter of fact it is a debatable point whether it is not just as quick to make an incision on each side of the bird, removing one testis at a time. It certainly simplifies the work and is safer for a beginner.

Great care must be exercised in removing the testis, as the tissue is easily broken and if not removed the organ will continue to form a secretion. Where accidents of this kind happen, the birds are termed "slips,"

and develop on similar lines to cockerels, becoming staggy if not marketed at an early age. The organs are very close to the aorta and large blood vessels, and a rupture due to unskilled work will cause a speedy death to the bird from haemorrhage. There is no need to stitch the wound, but capons must not be allowed to roost for a couple of days and should be given soft food only. The operation appears to cause very little discomfort and the birds usually eat readily immediately after they are caponised.

The wound heals with remarkable rapidity due to the resistance which birds have to wound infection from bacteria. It is advisable, however, to keep the instruments in a cold water antiseptic solution. The bathing of the wound also prevents haemorrhage. If the operation is correctly performed, very little bleeding takes place, even when cutting the abdominal wall.

"Wind-puffs," or "emphysema," is common a few days after the operation, due to air, which has worked between the skin when the bird breathes, passing through the wound before healing. A small X-shaped cut made in the skin when this condition is present enables the air to escape.

Success in caponising depends upon making the incision in the correct place to ensure having a plain view of the organs and upon their careful removal from the vertebrae. When confidence is gained the work is very simple, is quickly performed, and very few losses are incurred.

#### Capons.

Well-grown Orpington or Langshan capons would average approximately 10 lb. in weight at nine or ten months old, and there is not the hardening of flesh or amount of muscle fibre that is present in cockerels when matured. The quality of the flesh would at least be maintained till the capons are twelve months old, which is longer than it would be desirable or necessary to keep the bird.

Capons are of a very docile disposition and are ostracised by the hens and cocks with which they are run. The general characteristics of the male do not develop and the comb makes practically no growth at all. There is an abundance of feathering, and capons can usually be identified by the long flowing hackles and tail feathers. They develop best if allowed free range.

From two to three weeks before marketing or killing, the birds could be placed in small pens for the purpose of topping off, if desired. They are very inactive, however, and do not ordinarily take exercise or forage like other fowls.

Well ventilated houses and dividing the birds into small flocks tend to eliminate outbreaks of diseases, particularly roup, during February and March.

#### Reminders for September.

1. Keep an ample supply of clean, suitable shell grit before the flocks at all times. More grit will be consumed with the seasonal increase in production.

- 2. Remove hens from the nests as soon as they show signs of broodiness and place them in coops specially made for this purpose.
- 3. Examine roosts, &c., for presence of mite and tick (in country districts). A timely painting of the roosts with wood-preserving oil and spraying the houses with kerosene emulsion will save loss of egg production and prevent mortality in the case of tick.

NOTE.—Poultry-farmers are invited to write to the Department of Agriculture for pamphlets or information on any poultry subject with which they are not well acquainted.

#### IMPORTS AND EXPORTS OF FRUIT.

The following table, compiled by the Government Statistician, shows the imports and exports of fruit—fresh, dried, and processed—during the quarter ended 30th June, 1930:—

			· · · · · · · · · · · · · · · · · · ·	1	1			
Description.		Imports.	Exports.	Description.	Country of Origin	. In	nports.	Exports.
Interstate.							1	
imersiaie.		-	.~	Oversea.			l	
		Cases.	Cases.	Fresh Fruits-		0	entals.	Centals.
Fresh Fruit	••	695,624	197,111	Apples				22,941
Tomatoes	•••	113,152		Bananas			5,263	32
		cwt.		Lemons			88	993
Melons		10		Oranges .			244	8,405
		cases.		Grape Fruit			165	15
Bananas		34		Pears		- 1		2,466
		bunches.		Pineapples		1		1,344
,,		438		Other			241	13,708
		lb.	lb.			- 1		•
Canned Fruit		241,276	1,260	Dried Fruits-			1b.	lb.
			1	Apples				6,140
Dried Fruits-		l		Apricots			,	68,726
Unspecified		11,326	1,680	Currants			•••	53,427
Currants		8,050	140	Figs	. Smyrna		1,992	
Raisins		7.630	56		Asia Minor		2,226	
Apricots		1,344		Peaches				513
Apples		1,456		Prunes	1		•••	1,103
Peaches		672		Raisins-			•••	1,100
Pears	.,	336		Sultanas				660,980
Prunes	•••	3 400	165,564	Lexias	)			3,612
2 4 4440	•••	-,	100,002	Other .	1	-	•••	228
				Deter	35	1	7,337	17,507
				(3.1)	COL.		2,322	2,655
		1	1	Outer			170	
		l	1	Preserved in liquid			110	)
		1			l .			300 914
				, n- ,		- 1	•••	260,314
				70		-	•••	991,939
			1		• • • • • • • • • • • • • • • • • • • •	- 1		4,800
			1	Pineapples.		- 1	•••	836
			i	Raspberries	****** *****	1	•••	84,743
				Other .	*** *** ***	1.	G-11	11,715
		ļ	i	li '	1	- 1	Gallons.	
		1	1	1	*** ** * ***		6,680	1 .
		1			P ,	. 1	, ,	1 1 1 1

Australian Railways Developmental Tours for 1930-31. THE following tours of the "Reso" train have been fixed for the 1930-31

1. A six-day tour (17th to 22nd November, 1930) of the Blue Mountains and main western line and branches, including visits to Katoomba and Mt. Victoria, Jenolan Caves, Lithgow, Bathurst.

Orange, Wellington, Dubbo and Mudgee.

2. Six-day tours (19th to 24th January, 1931, and 18th to 23rd May, 1931) of the Northern and North Coast districts, including visits to Gosford, Newcastle, Port Waratah and Bullock Island, Maitland, Dungog, Grafton, Murwillumbah, Tweed Heads, Byron Bay and Lismore.

On these "Reso" tours ("Reso" is an abbreviation of the word "Resources") the tourists are not only afforded an opportunity of seeing the outstanding scenic beauties of the State, but the resources and possibilities of the country are impressed upon them in a way they can never forget. Representative local residents meet the visitors and show them the sheep and cattle stations, dairy farms, orchards, vineyards, and large developmental undertakings. Experts from the Agricultural and other Government Departments accompany the tours to give visitors full information regarding rural activities.

Details of the itineraries and costs involved are given in a pamphlet which can be had on application to the Chief Traffic Manager, N.S.W. Government Railways, Box 29A, G.P.O., Sydney.

Areas Sown to Different Varieties of Wheat in N.S.W. THE Government Statistician (Mr. T. Waites) recently issued the following statement showing the areas sown to different wheat varieties, both for grain and hay, during the 1929-30 season :-

Variety o	Variety of Wheat.				Variety	of Whea	t.		Area Sown.
Warstah Federation Yandilla King Turvey Canberra Nabawa Bena Marshall's No. Penny Free Gallipoli Nizam Currawa Gresley Wandilla Ranee Riverina Cleveland Purple Straw	33			Area bown.  acres. 817,138 679,043 431,512 281,556 236,399 203,217 195,126 141,123 126,029 122,946 108,944 95,777 67,092 61,211 59,755 56,856 49,291 47,543 31,603	Major Gluyas Early Minister Bald Early Florence Clarendon Baroota Wonde Rajah Firbank Cadia Duri Bobin Canimbla Early Bird Steinwedel Comeback Ford Gullen Other varieties	***			Area Sown acres. 28,319 25,753 17,064 17,003 13,609 12,189 9,514 7,171 7,011 6,563 5,791 4,678 4,440 3,703 3,563 3,234 4,235 257,966
Aussie Bomen	•••	***	***	30,837 30,214 29,882		Total	•••	,	4,335,000

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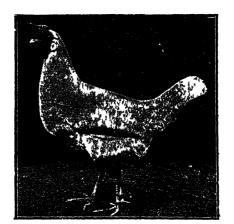
Contributions are only accepted upon the terms that the Government may subsequently publish the same in pamphlet form or otherwise.

1st October, 1930.

### CONTENTS.

DEPARTMENT OF AGRICULTURE.

## OULTRY





#### LEGHORNS. LANGSHANS. ORPINGTONS,

Available from the following Poultry Sections:-HAWKESBURY AGRICULTURAL COLLEGE, RICHMOND: THE GOVERNMENT POULTRY FARM, SEVEN HILLS; WAGGA EXPERIMENT FARM, WAGGA: GRAFTON EXPERIMENT FARM, GRAFTON.

#### BRONZE TURKEYS.

Available from Hawkesbury Agricultural College only. Birds bred under expert direction and grown on free range. The class required to improve farm flocks.

Price lists and particulars on application to the Principal or the Managers of the respective institutions.

> G. D. ROSS, Under Secretary, Department of Agriculture. SYDNEY.

Agricultural Gazette of New South Wales.

## The Propagation of Banana Plants.

H. W. EASTWOOD, H.D.A., Fruit Instructor.

COMMERCIAL varieties of bananas do not produce fertile seed, having long since lost the power to reproduce in this way, and consequently the edible banana is now entirely propagated by asexual methods.

Various parts of the plant, such as corms, butts or bulbs, junks or pieces, bits or eyes, and suckers, are all utilised for the purpose, and good results have been achieved by the use of all these by experienced growers. Each method has a number of supporters who claim their particular way of propagating is the best, and there are reasons why each can be used in preference to the others in particular circumstances. The consensus of opinion among growers to-day, however, is that the sucker or young offshoot is the most suitable means of propagating new plants. This is verified by the large number of suckers actually used in preference to any other portion of the plant.

Having accepted the use of suckers as the most suitable means of establishing new areas, it behaves growers to see that the suckers they use are of desirable type. This is a very important aspect, and given special attention it will eliminate one cause of unprofitable areas in later years of growth.

With all forms of fruit-growing the selection of suitable material for propagating purposes is yearly attracting more attention. By systematic selection the cropping propensities of plants may be increased and better quality fruit obtained. Vigour and uniformity of plant growth as well as the power to resist disease may also be developed. Banana growers of longexperience are not unmindful of these facts, but more attention can, with advantage, still be given to this work of selection. It is known that the class of plant set out will have a decided influence on the future life of the plantation in regard to yield, quickness of return, and general behaviour. Some plantations have been handicapped from the beginning because of the inferior class of sucker planted, their commercial success having been: unduly prolonged or even prevented by the planting of unsuitable suckers. The first crop of bananas does not contain as many large bunches as are produced after the area is well established. This defect is greatly aggravated by planting inferior suckers, and can, to a great extent, be overcome by selecting and planting only well developed suckers from heavily producing plants.

#### Types of Suckers.

The most important characteristic to look for in suckers for propagating purposes is vigour, which is denoted by the diameter of the bulb in conjunction with the length and shape of the pseudostem. (See Fig. 1.) The size of the untopped sucker or the size of the bulb by itself is not always a true indication of vigour. (See Figs. 4 and 5.) Experienced growers know that:

the vigorous offset is one which has developed a good bulb, has the pseudostem of the sucker uniformly decreasing in girth (tapering) from the bulb to the apex, the leaves small and narrow in comparison to their length and with an inclination to grow upright. These suckers, which are known as "spearheads" or "sword-suckers," are strong growers and produce good plants which subsequently carry nice bunches of fruit. By choosing this type of sucker growers will secure a vigorous plant which will avail itself of any advantage of good soil and suitable climatic conditions.

The bulb of the sucker contains concentrated food for the young plant, which is primarily used in the formation of new roots and leaves. The bigger the bulb is (provided the type is correct) the larger the quantity of

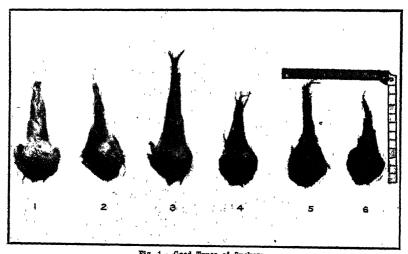


Fig. 1.—Good Types of Suckers.

All these were dug from a three-year-old area, and are "spearhend" suckers with large bulbs, tapering to points at the apexes.

food available for the young plant to draw upon. The greater the food supply the better able is the young plant to overcome the shock of removal and to throw out new roots and leaves.

Always discard suckers with poor bulbs, stems of even girth instead of tapering, and those which show a tendency to support their leaves horizontally. These rarely, if ever, grow into good plants or produce satisfactory first bunches. It is also likely that the "follower" suckers will not be much better than the original ones.

Offsets of the type commonly known as "umbrella" and "water" suckers and "onion bulbs" should never be used for propagating purposes.

## The Age of the Plantation and Sucker Selection.

The successful establishment or otherwise of all new life is to a great extent dependent on the vitality and maturity of the parents, and the banana plant is no exception to this rule. A plantation well established

and in its prime, with the plants growing vigorously, will produce offsets which are superior to those from any other class of plantation. This period is considered to be when the plantation is from three to six years old, depending on circumstances and environment. Although these years represent the average, it must be understood that wide departures may occur in some plantations. With ideal conditions and favourable seasons, together with very careful attention throughout, a plantation will produce very good offsets in large numbers before and after the three to six years-old period. These suckers may be very little inferior to, or may be the equal of, those produced during that time.

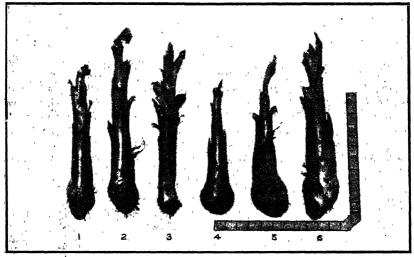


Fig. 2.—Average Types Dug from a One-year-old Plantation.

Suckers 4 and 5 are superior to suckers 1, 2, and 6, while sucker 3 is a poor type and should be rejected. None is in the same class as those in Fig. 1.

The suckers in Fig. 1 are from a three-year-old area, and all are good types of offset. No. 1 has the largest bulb, which is 6 inches in diameter, whilst No. 4 has the smallest bulb, with a diameter of 3½ inches. These suckers are well grown, have a large and solid bulb, have been regularly and normally formed up to the time of digging, and show every indication of robustness. They will overcome the setbacks received in transplanting better than other types of suckers, and will make quick and strong growth when set out under favourable conditions. Growers would not make any mistake in obtaining offsets of this type from vigorous plantations of the ages suggested.

#### Aged Plantations.

Aged plantations which are rapidly declining, or those which, though not necessarily aged, are devitalised by adverse conditions, are unsuitable for the selection of suckers for propagating purposes. Although some suckers

of reasonably satisfactory type may be selected from such plantations, the majority of the suckers will resemble those shown in Figs. 4 and 5. These are a very inferior type of offset, which should not be planted under any circumstances. The bulbs of the suckers in this class of plantation become very much restricted and "hidebound" and do not expand normally with growth. Prominent concentric rings form around the corm, which has a peculiar woody or corky and scaly appearance, while some have long rhizomes or elongated "necks" (see Nos. 2 and 4 in Fig. 4), which are signs of weakness. The "eyes" of the bulb, although formed and partially developed, may never grow. The top growth, which is weak and poorly developed (Fig. 5) has a pseudostem of even thickness. If this type of offset is planted the subsequent root growth will be weak and unthrifty, and the plant will stagnate at a later stage. To trust to luck and to plant this class of corm or sucker and expect something better from the "follower" sucker is encouraging disastrous results.

#### Year-old Plantations.

Since certain restrictions have been placed on the movement of plants on account of disease and pests the procedure of securing plants everywhere and anywhere—diseased or otherwise—has been stopped. Growers who have favourable areas are allowed to use their own suckers for extending plantations under certain conditions, and where the plantation has never had disease or pests they may also receive permission to sell suckers. A plantation that would be in a position to secure the latter privilege in a district where bunchy top or beetle borer or both have been recorded for any length of time would probably be a young area—perhaps not older than one year from planting. Even if a grower obtains permission to sell suckers or the liberty to use his own plants, as many have done, there is another aspect to be considered. He must be sure that the suckers from such a young plantation are entirely suitable for establishing new areas. No doubt many suckers from these areas are satisfactory, but only limited numbers of this type are available, and even they are not equal to suckers from older established areas. Moreover, two or three or perhaps more suckers of the very best type on the stool are never interfered with, as they are chosen by the grower as "followers" to replace the mother plant. This practice naturally reduces the number of good suckers available for digging. Advanced "peeper" suckers are usually plentiful, but these may not prove wholly successful for planting out. Fig. 2 depicts six average suckers dug from a one-year-old plantation, and only two of these, viz., Nos. 4 and 5, are considered suitable offsets, though even these are not comparable with the suckers in Fig. 1. Suckers Nos. 1, 2, and 6 in Fig. 2 can only be considered of medium quality, and are not as good as suckers Nos. 4 and 5. Sucker No. 3 is a "water" sucker and would not be selected for planting by any keen grower.

The suckers secured from a year-old plantation have the characteristics of good suckers in the making, but they are under the disadvantage of not having had sufficient time to develop properly and produce a good solid

bulb. They are not consistently "spearheads," and the trunk does not decrease in proportion to its length (see suckers Nos. 1, 2, and 6 in Fig. 2). This may be accounted for by the fact that they are the first offsets from the parent stool and their growth is forced much more than is generally the case when a stool has become established. Usually they are young, soft and sappy, and have not had sufficient time to harden off and set.

Every extra week in the spring months that suckers of this type are allowed to remain with the stool will quickly improve them by filling out the bulbs, and therefore the later in the season they are dug the better



Fig. 3.—Types of Suckers Dug from a very Vigorous Year-old Plantation.

All are suitable for planting if given proper treatment, but are not considered the equal of suckers shown in Fig. 1. They are to be preferred to those in Fig. 2 mainly because they are from a very vigorous plantation and were dug later in the planting season.

they will be. The difference of three months between September and December digging will mean a very marked advancement in the suckers, and superior offsets will be the result. Fig. 3 shows suckers dug from a one-year-old area in December, and these are more suitable than the suckers shown in Fig. 2, mainly because they are from a very vigorous plantation—better than the average year-old plantation—and were dug later in the planting season.

As suckers secured from a year-old area are tender and watery they will not stand rough treatment or abuse and should be carefully handled to guard against bruising, and to prevent unnecessary wilting they should be planted as soon as convenient after digging. Even if this is done they

wilt a good deal in the soil unless the weather for transplanting is favourable, when an immediate and good "strike" is assured. If a continued dry period sets in after planting, periodical waterings are necessary.

#### Digging the Suckers.

Suckers selected for transplanting or for sale should be most carefully removed from the stool, and this is not always easy when they are dug from plantations with stiff soils or boulder-strewn surfaces, or from some young areas. The difficulties of digging are further increased when the correct practice of leaving those suckers farthest away from the stool as " followers" to the parent plants is adhered to. The utmost attention is required to see that neither the parent plant and its roots with the remaining suckers nor the chosen suckers are unnecessarily injured. Although every precaution may be taken to prevent losses, it is so easy to damage suckers that there is always a percentage which gets injured in the digging, and some are totally destroyed. All badly mutilated suckers should be rejected on the spot, and no offset that the grower would not be prepared to plant himself should be included when digging for sale.

The hoe and mattock are not satisfactory tools with which to dig suckers, but are useful to loosen the soil or undermine the offset on the open side when such is necessary. A spud-bar is a much more suitable implement, but where any quantity of digging is being done a specially made bar with a long, flat and wide blade and keen edge is even better, for there is less likelihood of causing damage with this implement.

The surface soil should be removed or freed sufficiently to enable the grower to see where the sucker and parent plant join, and the instrument then placed where the union is narrowest (to lessen the surface to be cut) and forced firmly downwards to sever the offset with one clean cut. With the larger suckers it is necessary to aim the spud-bar at this spot from a distance, and unless the operator has a good and true eye it is likely that the sucker may not be severed at the correct place or that it will receive more than one wound. In other cases suckers in awkward positions have to be dug from both sides, which increases the cut surface.

Where leverage is necessary in removing the sucker, it should be applied gently and gradually to obviate crushing or bruising the plants, and no more force should be used than is required to loosen the sucker.

Growers should see that the digging of suckers is carried out only by persons who recognise what the results of negligent or careless digging are, both in loss of good suckers and damage to the existing plantation.

#### Damage to the Plantation.

All offsets are actually fed by and are dependent on the parent plant until they become large enough to produce their own roots in sufficient numbers to establish themselves as separate units. Suckers selected for transplanting rarely reach this stage before they are removed.

Although it is necessary to avoid damaging these offsets, it is much more important to see that no injury is occasioned to the established plants or their roots. The importance of this fact is not always fully appreciated. Damaged suckers can be discarded, but damaged plants must remain till their functioning is completed with the removal of the bunch. Injury to parent plants is extremely hard to remedy; in fact, nature alone seems to be able to do this. By very careful digging of the suckers it may be possible to avoid damage to the parent plant itself, where the suckers are a sufficient distance away for convenient working of the tools. It is not possible, however, to avoid severing the roots of the parent plant which are intermingled and tangled all around the corm for some distance out, but this injury can be lessened by clean cutting instead of bruising or pulling the

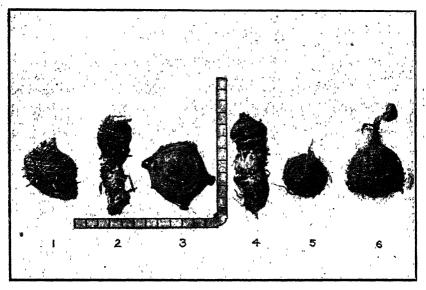


Fig. 4.—Types of Bulbs or Corms Associated with Aged or Declining Plantations, or grown under Adverse Conditions.

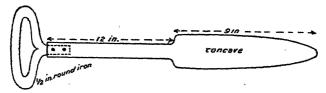
These should be rigorously rejected, being most undesirable. Corms 3, 5 and 6 are typical "onion" bulbs.

roots from their position. Older established areas are better able to overcome this setback than younger plantations—especially year-old enes—as they have proportionately less roots injured and have a much larger feeding area to draw upon immediately.

The damage caused in this way to parent plants in young areas is very great and much more serious than many growers realise until they have been convinced by actual experience, and it is then too late to rectify the position. Allowing that cleanly-severed roots will produce new roots where they are cut within a short time, there is still the temporary check received, which is sustained in proportion to the ability of the plant to recover.

In Fig. 6 is shown a year-old plant suckering freely. If three of the seven suckers noticeable are removed at about equal distances around the mother plant, the roots will be cut in three places and at least half of the roots on the side of the stool facing the camera will be interfered with, if not actually severed, and for any other suckers removed additional roots will be severed. Similar damage, according to the number of suckers removed, will be done to the other half of the stool and no plant or stool can stand such treatment without showing the effects. The plant will receive a check-maybe a severe one-when it is about to throw a bunch, which is a very critical period in the life of the plant, or the bunch may be out at the time. In either case the plant then needs all its root system to support it, and the setback received by a reduction of its root system, together with the handicap of growing new roots, happens at a most undesirable time. A reduction in the size of the fruit or a poorly-filled bunch is likely to be the result, and it is doubtful if the suckers obtained from a stool are worth this risk.

Some growers have removed suckers from young areas for their own use, thinking that by so doing they were acting wisely in reducing the number of suckers so as to give the remainder a better chance. Later on, when the resultant damage becomes apparent, they have become convinced that the practice is not sound in a young area. Although a monetary gain is made by the saving of the cost of the suckers or by obtaining the value of them if disposed of, the loss later on, due to small bunches and inferior quality fruit, is not fully compensated for by the earlier saving.



A "Banana Gouge" or De-suckering Implement. Specially devised for the purpose by Mr. R. G. Bartlett.

#### De-suckering versus Digging.

The question then arises in these young, vigorous areas where suckers are plentiful as to what is to be done with the suckers which are not required as "followers" to the main plants. The grower sees that he has a surplus of suckers, and he reasons that if they have to be reduced to regulate the habits of the stool it is better to dig and use or sell the suckers and obtain their value than to sacrifice them—which seems logical reasoning. The undesirable results which follow such a practice, however, have already been pointed out.

These suckers should be "de-suckered," that is, they should be destroyed by the removal of the growing point without interfering with the stool in any way. This operation is a very different one to digging the suckers. De-suckering is performed by cutting the sucker off at ground level, or as

near the ground as possible, with a sharp knife. Then the point of a de-suckering implement or "banana gouge" (see Fig. 7) is inserted, at an angle of approximately 30 degrees from the vertical, just inside the outer edge of the base of the sucker to be removed, and with a semi-circular turn of the handle to the right and left the "potato eye" or growing point of the sucker is removed with a section of the bulb the shape of an inverted cone. If the operator considers it necessary (which depends on the size of the bulb of the sucker) he can then push the tool vertically into the remaining stump, and by using it auger fashion remove a further conical section right through the bulb to the soil underneath. The main thing

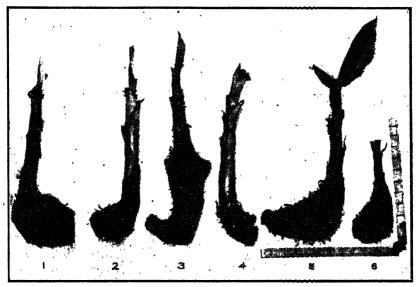


Fig. 5.—Another type of Sucker usually Associated with the same conditions as mentioned under Fig. 4.

These should also be rejected, being little better than these shown in Fig. 4.

to be sure of when de-suckering is that the growing point of the sucker, known as the "potato eye," is destroyed, and this is more easily performed when the suckers are small, preferably not more than 1 foot high. The growing point, situated in the heart of the corm, can be easily detected by its closely-grained formation in comparison to the rest of the bulb.

It will be seen that by this method of destroying suckers the root system of the entire stool is untouched and no other damage is caused to the remaining plants.

#### Preparing Suckers for Planting.

After the suckers are dug, each plant should have all the roots carefully trimmed off close at the bulb, and all leaves should be systematically removed to minimise transpiration. The suckers can then be planted

without further preparation, but if they have much top growth this is reduced to within from 3 to 6 inches of the top of the corm. Some growers believe in doing this with all classes of suckers except "peepers," claiming that they shoot quicker and grow better. There does not appear to be any disadvantage to the practice, as the old top of the sucker rarely functions after transplanting, but it temporarily acts as a protection to the new leaves coming from the centre.

The freshly cut surface of the sucker, where it has been severed from the mother plant, is prone to the attack of fungi, bacteria and insects, and there is danger from decay and rots at these places. To decrease this possibility the suckers should either be allowed to remain in the sunlight for a few days with the cut surface exposed, which will assist the wound to heal and callous over, or they should be treated with an approved kind of plant medicament which is allowed to dry on the surface.

The former method is usually regarded as satisfactory for bulbs sufficiently large—say 3 inches in diameter or over—and matured to suffer no ill effects from the sun, but where the suckers are small, young and naturally sappy, especially those secured from year-old areas, they are usually too tender for this method and will wilt and dry out considerably. It is suggested that these suckers be treated by the latter method and then planted as soon as possible. I am of the opinion, however, that any sucker suitable for planting, whether large or small, should first have the wounded surfaces treated with a protective material, and should then be immersed for a period of one hour in a solution of corrosive sublimate in the proportion of not less than 1 lb. sublimate to 90 gallons of water. They should then be planted within a reasonable time.

All suckers which have been badly damaged in digging or otherwise seriously injured should be rejected. Often a portion of the bulb and, at times, as much as half of the corm are chopped off in digging. As long as they show signs of life suckers are sometimes planted, but satisfactory results cannot be expected from such plants.

#### The Supply of Suckers.

During past periods in the history of the banana industry, and especially during the boom years, the supply of suitable plants for propagating purposes has not been equal to the demand. To-day the position is different; there is no scarcity of suitable plants and the supply is equal to the demand, with every indication of a surplus of satisfactory plants in the future. No genuine excuse can be advanced by growers for planting undesirable types of plants, and henceforth the best only should be considered good enough to propagate.

Since regulations have been in force for controlling certain diseases and pests of the banana, trafficking in plants both within the State and with other States has grown into a business of significance in the industry. Growers are now compelled to obtain their supplies of plants for new areas from certain sources approved of by the Department of Agriculture. They

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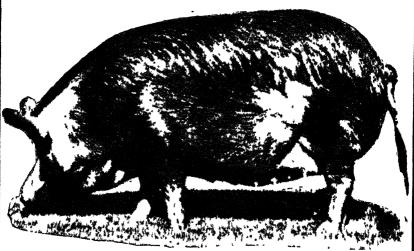
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have no option but to do business with the more fortunate growers who have clean areas. These conditions have given these favoured growers a monopoly of the sale of plants, and in most cases they fully recognise this, but in some instances it would appear they are using this privilege unfairly in that they expect the buyer to accept any class of sucker or plant which they have for sale, irrespective of whether it is a suitable offset or not, so long as it carries a certificate of freedom from disease and pest.



Fig. 6.—A Stool one year after Planting.

Note the heavy sucker growth. Seven suckers are visible on the side nearest the camera. To dig all surplus suckers from such a plant would destroy or considerably damage root growth and markedly check the parent plant.

The price of suckers or plants has advanced from about 20s. to 25s. per hundred (the price ruling prior to the introduction of the regulations) to from 35s. to 50s. per hundred, depending on the district of supply, since the regulations became operative. This is roughly a 100 per cent. increase,\* and is mainly due to the fact that the suckers are now guaranteed free of bunchy top and beetle borer. Yet no grower objects to these prices and they are willingly paid by planters, but complaints have been made to officers of the Department of Agriculture regarding the unsuitable type of sucker received from vendors, and I have personally seen plants received by growers which were very little better than those depicted in Figs. 4 and 5. This is purely a matter for the interested parties to adjust, as the

<sup>\*</sup> Exceptions are known where suckers are secured at a lower rate than quoted.—H.W.E.

Department has no control over the class of offsets unless they are affected with disease or pest, or suspected to be affected, in which cases permission to move or plant them can be withheld.

When a buyer is satisfied to pay the price asked for suckers to-day, he is entitled to receive 100 per cent. of good plants, suitable in every other respect as well as being healthy. There is no doubt the purchasr has himself to blame for any unsatisfactory position, for, as a rule, he makes no contract nor stipulates any conditions under which he will accept delivery of the plants. Under such circumstances it would be difficult to obtain redress, and although the vendor may agree to replace or make allowance for worthless plants supplied, the buyer is disadvantaged in that he may be obliged to plant a smaller area than intended, or, if additional suckers are supplied later, an uneven, patchy area will most likely be the outcome, to say nothing of the extra freight and cartage charges.

#### Suggested Conditions of Sale.

As the vendor insists on conditions to protect his side of the business, the buyer should do likewise. Although it may be very difficult to contract satisfactorily for just the kind of offset the planter wishes to obtain, a fair degree of satisfaction can be ensured by insisting upon the following conditions:—

- \*1. Roots of all plants to be removed before leaving the plantation.
- \*2. All plants to be free of soil and rubbish.
- 3. The bulb or corm of the plant, measured at the smallest diameter, not to be under 2, 3, 4, 5, or 6 inches (according to the dimension preferred by the individual buyer).
- 4. The appearance of the suckers or plants to show the recognised signs of vigour.
- 5. Offsets acknowledged as "onion" bulbs, "water" suckers, or those with narrow elongated rhizomes will not be accepted.
- 6. Plants showing reddish-pink spots when the bulb is sliced will be rejected. (This is an indication of root disease.)
  - 7. Badly damaged and mutilated suckers will not be accepted.

## BIG INCREASE IN AREAS UNDER SOYBEANS IN U.S.A.

EXTENSIVE utilisation of the soybean for forage and the increased use of the beans for oil and meal and for human food have resulted in a phenomenal increase in acreage and production of the crop in U.S.A. By reason of its variety and the palatability of the forms in which it can be served, the soybean has come to be considered a very desirable article of human food, and its use as such is gradually increasing.

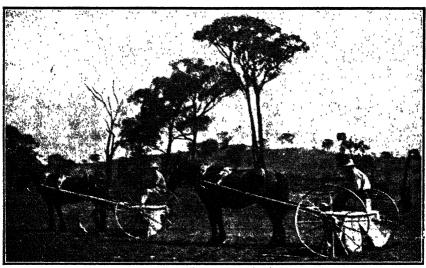
<sup>\*</sup>These two conditions, inter alia, now a ply to plants introduced into this State, but not to plants moved within the State. They lessen the chance of introducing into a new plantation nematode worms and root disease, besides harmful fungi and bacteria, which may have been in the soil the suckers came from.

# Pasture Improvement Work in the Binda District.

#### J. N. WHITTET, H.D.A., Agrostologist.

Pasture improvement operations were commenced in 1927 on the property of Dr. R. O. Williams, "Chatsworth," Binda, along the lines of subdivision of large grazing paddocks into smaller areas, top-dressing with superphosphate and distribution of and working in of seed of Subterranean clover amongst the natural pasturage.

Binda is located 17 miles north-west of Crookwell, and its elevation is 2,400 feet. The average annual rainfall at "Chatsworth" for the past nine years has been 27.93 inches. The composition of the natural pasture covering of this district is as follows:—Grasses—Wallaby (Danthonia semi-annularis 15 per cent., D. racemosa 25 per cent.), Kangaroo (Themeda Forskalii) 12 per cent., Tussocky Poa (Poa caespitosa) 5 per cent., Wheat



the mainites used when only a Comparatively Small\_Area\_was\_Top-dressed.

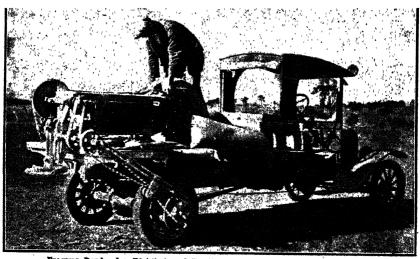
grass (Agropyrum scabrum) 3 per cent., Soft Brome (Bromus mollis) 2 per cent.; clovers—Ball (Trifolium glomeratum) 14 per cent., Hop (T. procumbens) 12 per cent., Haresfoot trefoil (T. arvense) 7 per cent., Burr clover (Medicago denticulata) 5 per cent. Barley grass (Hordeum murinum) occurs on sheep camps, and White clover (Trifolium repens) in low-lying situations.

#### The Improvements Effected.

The area of "Chatsworth" is 4,300 acres, and it is subdivided into twenty-eight paddocks. The manager, Mr. C. M. Williams, is of the

opinion that subdivision is necessary in order to control efficiently the growth of feed. As Binda is a district of small holdings, and offers excellent possibilities for pasture improvement work and the production of fat lambs, subdivision of paddocks is the first essential to obtaining the best results from the grazing of improved pastures.

In May, 1927, a commencement was made by top-dressing four paddocks of a total area of 465 acres and broadcasting and chain harrowing in Subterranean clover seed over 82 acres. The results obtained were particularly good, despite the fact that the rainfall for the year was below the average. In 1928 the top-dressed area was increased by a further 500 acres, and although the first six months of the year were exceptionally dry, only 875 points of rain falling, the general growth was similar to that of the previous year. In 1929 an additional 700 acres were treated, and in May of this year the whole of the balance of the property received fertilisers, while on 1,200 acres Subterranean clover seed was broadcasted at the rate of  $2\frac{1}{2}$  lb. per acre, but not harrowed in.



Progress Rendered a Distributor of this Type Essential on Mr. Williams' Property.

The Stock Carried on Improved Pastures.

In co-operation with the Department, Mr. Williams has kept detailed records of the stocking of a number of the "Chatsworth" paddocks. The estimated carrying capacity of natural pastures in the district is one sheep per acre. This figure is applicable to the period 1st July, 1928, to 30th June, 1929, but the following twelve months were drier, and the stocking of the country was appraised at three sheep to 4 acres.

The monthly rainfall totals for the two periods were as follows:-

July, 1928, 262 points; Angust, 75; September, 160; October, 268; November, 99; December, 11; January, 1929, 102 points; February, 437; March, 255; April, 92; May, 109; June, 255 points; total for 1928-29, 20.95 inches.

July, 1929, 81 points; August, 202; September, 127; October, 91; November, 536; December, 239; January, 1930, 6 points; February, 13; March, 21; April, 147; May, 173; June, 197 points; total for 1929-30, 18.33 inches.

Paddock No. 1.—Area, 186 acres; natural pasture; top-dressed with 1 cwt. superphosphate per acre during May, 1927, and 6 lb. of Subterranean clover seed per acre harrowed in on 60 acres.

The stocking during the period July, 1928, to June, 1929, was as follows:—

STOCKING, 1928-29.

	Grazing Period.								
1928									
July and Augu	ıst			58	days	•••		400	
October	•••	•••		18	,,			466	
November and	Decen	ıber	•••	23	**	•••		464	
December	•••	•••	•••	20	,,	•••		434	
1929—									
January	•••		•••	4	,,			434	
,,	•••			12	99	•••		896	
,,	•••	•••	•••	13	,,	•••		468	
February and	March			32	**	•••		765	
April-June	•••	•••	•••	<b>6</b> 5	"	•••		745	

The carrying capacity of this paddock for the twelve months' period was 2.1 sheep per acre.

During May, 1929, the paddock received a further application of 1 cwt. superphosphate per acre, and 2 lb. of Subterranean clover seed per acre was broadcasted on the 126 acres which did not receive seed in 1927. Seed was mixed with the fertiliser, but not harrowed in.

The stocking from July, 1929, to June, 1930, was as follows:-

STOCKING, 1929-30.

	No. of Sheep.						
July October and Nove				days		•••	$743 \  \{588 \text{ ewes.} \  \   464 \text{ lambs.} \  \   600 \text{ sheep.} \  \$
January to March April	•••	•••	15	)) ))	•••	•••	600 sneep.
April-June	***	•••	66	"	•••	•	200

The carrying capacity for the twelve months' period was 1.50 sheep per acre. In this and subsequent tables two lambs are calculated as being equivalent to one sheep.

Paddock No. 2.—Area 280 acres, of which 200 acres were top-dressed during June, 1927, with 1 cwt. superphosphate per acre.

The stock carried during the 1928-29 period were as follows:-

STUCKING,	1928-29.
-----------	----------

	Gra	zing 1	Period.				No. of Sheep.
July August-November 1929— January-March April-June			.,.	108 3 55	"	 •••	$102$ $\begin{cases} 700 \text{ ewes,} \\ 532 \text{ lambs,} \\ 464 \text{ sheep.} \end{cases}$ $800$ $770$

The carrying capacity for the twelve months' period was 1.99 sheep per acre. In May, 1929, 1 cwt. of superphosphate per acre was applied to the whole of this paddock, and the following stock were carried from July of that year till June, 1930.

STOCKING, 1929-30.

		Gra	zing	Period.					No. of Sheep
1929—									
July	•••	•••	•••	•••	15	days	•••	••••	775
August-	Octob	er	•••	•••	37	,,	···		$\int 588$ ewes. $\int 464$ lambs
Novemb	er-De	cember	•••	•••	40	*	•••	•••	$\begin{cases} 769 \text{ ewes.} \\ 496 \text{ lambs} \end{cases}$
1930				, ,					C
January					28	,,			,,
March		•••			10	**			750 sheep
April					$^{26}$	**	•••		375

The carrying capacity for the twelve months was 1.26 sheep per acre. Paddock No. 3.—Area, 200 acres; top-dressed with superphosphate as follows:—120 acres at 1 cwt., 40 acres at  $1\frac{1}{2}$  cwt., and 40 acres at 2 cwt. during May and June, 1928.

The stocking during 1928-29 was as follows:-

STOCKING, 1928-29.

Grazing F	No. of Sheep,					
July-September September and October October 1929 January and February February-April June	***		days			492 396 465 739 816 800

The carrying capacity of this area for the twelve months period was 1.74 sheep per acre.

During the spring of 1928 no appreciable difference in growth was noticeable on the section treated with 1½ cwt. of fertiliser per acre compared with that receiving 2 cwt., but an increase was apparent between the 1½ cwt. and the 1 cwt. applications, the extra 56 lb. of superphosphate giving 25 per cent. more clover growth.

No additional application of fertiliser was made during 1929, and the stocking of the paddock was as follows:—

STOCKING, 1929-30.

Grazing P	No. of Sheep.				
1919— July		7 days			797 (781 ewes.
August and September	•••	25 ,,	•••	•••	504 lambs.
November and December 1930—	•••	51 "	•••		797 { 781 ewes. 504 lambs. } 586 ewes. 476 lambs.
January	• • •	20 ,,	• • •	• • •	,,
March and April	•••	17 ,,	•••	•••	600
April and June	•••	65 "	•••	•••	250

The carrying capacity for the twelve months was 1.59 sheep per acre.

During April, 1930, this paddock received 1 cwt. superphosphate and 3 lb. of Subterranean clover seed per acre.

Paddock No. 4.—Area, 150 acres, of which 120 acres received 1 cwt. superphosphate per acre in May, 1928.

The following stock were carried during 1928-29:-

STOCKING, 1928-29.

Gra	N	No. of Sheep				
de sel-criticism plants se						
1928					- 1	
July	•••	•••	30 days			102
August-October	•••	•••	70 "	•••		272
December		•••	21 ,,	•••	-,.	899
1929						
January	•••	•••	12 ,,	***	• • •	469
	•••	•••	7,	•••	•••	680
February	•••	•••	3 ,,	•••		185
February and March	•••	•••	15 "	•••		352
March-May	•••		73 ,,	•••		280
May and June	***	***	47 ,,	•••	••••	341

The carrying capacity for the twelve months was 1.71 sheep per acre.

The paddock was again top-dressed with 1 cwt. superphosphate per acre in April, 1930, and 2 lb. Subterranean clover per acre was applied with the fertiliser. The stocking of the paddock during 1929-30 was as follows:—

STOCKING, 1929-30.

Graz	No. of Sheer						
929							
May-July	•••		62	days	•••		337
August-October	•••	•••	44	,,	•••		344
October	•••		3	,,	•••		214
October and November	r		35	,,		•••	500
November and Decem	ber		8	,,	•••	:	173
December	•••	•••	5	,,	•••	•••	80
1930							
January			2	,,	•••	•••	223
,,			5	,,	•••	•••	173
January-March	•••	•••	50	,,	•••	•••	257
March and April	•••	•••	21	,,	***	•••	119
April and May	•••	•••	24	**		•••	175

The carrying capacity for the twelve months was 1.40 sheep per acre. This is the shearing shed paddock and consequently the area is grazed heavily at certain periods of the year, with the result that the detrimental effects of overstocking on clover growth is very apparent on this section of the property.

Ram Paddock.—The beneficial effect of top-dressing Subterranean clover in two successive years was very apparent in this area of 22 acres, on which 3 lb. of Subterranean clover seed per acre was well harrowed in amongst the natural pasturage in May, 1927; 1 cwt. of superphosphate per acre was broadcasted with the seed and a similar quantity of fertiliser applied in May, 1928.

For 335 days fifty-three rams were in this paddock, and thirty-three rams for the remainder of the year. These figures give a stocking record of 2.33 sheep per acre. The rainfall for the period of the test (1st May, 1928, to 30th April, 1929) was only 20.74 inches.

This area was a cultivation paddock some years ago, and as the natural grasses had not thickened up to any extent this section of the property was never considered to be "sheep to the acre" country.

Additional Stocking Records for 1929-30 Season.—The carrying capacity of a number of additional paddocks was recorded during the 1929-30 period. As only the twelve months records are available in these cases they are summarised below.

STOCKING, 19	29-30.
--------------	--------

Paddock.	Area.	Treatmont.	Carrying Capacity per acre per annum.	
No. 5	Acres. 80 (including 10 acres grazing lucerne).	Pasture top dressed with 1 cwt. superphosphate per acre, May, 1928; 40 acres top dressed with 1 cwt. superphosphate and 2 lb. Subterranean clover seed per acre in March, 1929.		
"6	260	Top-dressed with 1 cwt. superphosphate and 2 lb. Subterranean clover seed per acre, April, 1929; 120 acres top-dressed with 1 cwt, superphosphate per acre in May, 1930.		
,, 7	300	Top-dressed with 1 cwt. superphosphate per acre in May, 1928, and again in May, 1930.	1.58	
"8	135	Top-dressed with 1 cwt. superphosphate per acre in March, 1929.	1.47	
9	250	Top-dressed with 1 cwt. superphosphate per acre in April, 1929.	1.47	

#### Conclusions.

From the results already obtained on "Chatsworth" the manager considers that the following advantages have been gained:—

- (1) Increased carrying capacity.
- (2) Increased health of the stock generally.
- (3) Increased value of pastures from a fattening standpoint.
- (4) Increased wool and meat production per head of stock grazed.

The methods adopted to achieve the results given for top-dressing natural pastures without the use of Subterranean clover cost 3s. per acre, where one application is made every second year.

It has been noted on this property that where 1 cwt. superphosphate per acre is applied (to previously untreated natural pastures) for two years in succession, the body of the pasture thickens up very rapidly. After such treatment the land could be left for two years without any further treatment and the usual practice of top-dressing every second year resorted to.

During the 1928-29 period it was particularly noted that weaners pasturing in top-dressed paddocks were remarkably free from worms, whereas these parasites were very plentiful in sheep grazing on unmanured pasture.

On referring to the rainfall records for the periods under review, it will be seen that the amount of rain which fell in each of the twelve months for which the stocking was recorded was considerably below the average annual rainfall for the district.

#### RESULTS OF THE WHITE MAIZE COMPETITION, 1929-30.

This competition, for which Messrs. Kellogg Ltd., annually donate the sum of £150-£30 to be divided among the fi st, second, and third prizewinners in each of the five competition districts—was again carried out during the past season. In judging this competition, points are allotted on the same basis as for the field maize competitions, with an additional fifteen points for "Suitability for manufacture."

Many excellent crops were submitted and interest in this competition is increasing. The samples submitted for allocation of points for "Suitability for manufacture" were mostly of a high quality, although competitors are inclined to overdo things by selecting to a show standard rather than main aining a standard based on commercial requirements.

RESULTS of the 1929-30 Competition.

Competitor.	Cultivation.	Germination and Stand.	Condition and Evenness.	Freedom from . Insect Post and Disease.	Purity and Trueness to Type.	Estimated Yield.*	Total.	Suitability for Manufacture.	Grand Total.	Variety.	
	20	10	10	10	15			15			
No. 1 District—Upper North Coast.											
R. F. Hicks, Gordonville	181							1 44			
†T. G. McDougall, Fern- mount.	18	8 8 <u>1</u>	81 81	8 71	12 12	28½ 28½	83 <u>1</u> 83	14 121	971 951	Silvermine.	
†J. H. Bennett, Fernmount (No. 1 Entry).	18	8	8	71	121	28 <del>1</del>	821	13	951	"	
No. 2 District-Lower North and Central Coast.											
J. B. Scobie, Austral Eden	171	91	9	1 6	8 1	36	86	12	1 98	Silvermine.	
J. P. Mooney, Taree	161	81	81	81	8	33	83	131	961		
J. F. Mooney, rates	109	OF	02	0.2	"	99	0.0	194	90%	Hickory King.	
Colin Shields, Mt. George, Somerset.	18	9	8	9½	8 <u>‡</u>	27	80	141	941	,,	
		No.	3 Dist	rict—So	uth Coas	st.					
James Graham, Barrengarry (No. 1 Entry).	19	9	9	9	14	36	96	14	110	Hickory King.	
D. V. Boyd, Terrara, via	18	8	8	8	12	371	911	141	106		
P. F. Keenan, Barrengarry	19	9	8	9	14	30	89	15	104	,,	
No. 4 District—Tumut and Gundayai.											
James Back, een., Upper Gilmore, Tumut.	18	81	8	9	12	42	971	15	1121	Murrumbidgee White.	
E. E. Vickery, Tumut Plains	18	8	8	81	111	42	96	12	108	Murrumbidgee White	
tA. L. Claffey, Blowering, Tumut (No. 1 Entry).	18	8	8	8	11	39	92	121	1041	winte.	
Brown and Davis, Tumut Plains.	161	71	81	6	111	42	92	121	1041	,,	
No. 5 District-New England.											
G. B. Koch, Steinbrook, Tenterfield (No 1 Entry).	171	81	8	81	101	38	86	14	100	Hickory King.	
Rolph Bros, Bungulla, Ten- terfield.	17}	71	8 <del>1</del>	73	10	80	81	14	95	,,	
M. P. Shaonan, Salisbury- road, Uralia.	18 <del>]</del>	8	7	8 <del>1</del>	8	27	77	14	91	Silvermine,	
					1	. 1	1	- 1			

<sup>\* 3</sup> points for each 10 bushels per acre in the case of Districts 1, 2 and 3, and 3 points for each 5 bushels in † Bquai for second place.

† Bquai for third place.

† Bquai for third place.

<sup>-</sup>L. S. HARRISON, Special Agricultural Instructor.



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### Maize on the Far South Coast.

VARIETY AND MANURIAL TRIALS, 1929-30.

JOHN L. GREEN, H.D.A., Agricultural Instructor.

ALTHOUGH maize trials have been extensively conducted for only two seasons in this district, it is now possible to make fairly definite recommendations as to varieties, etc.

#### The Season.

The spring of 1929 was as near to ideal as could be wished. Good rains during August throughout the district made possible a thorough preparation of the land, and it was possible for those farmers who had ploughed early to germinate a considerable number of the weed seeds present in the soil. Mainly for this reason, and also by virtue of the fact that after the last cultivation the rainfall was light, weed growth was practically negligible and had little effect on the ultimate yields. This was more noticeable on the alluvial areas, where weed control presents more of a problem than on hill-land.

RAINFALL during the Fallow and Growing Periods.

1929.   pts.   pts.		 											
June      17     23     15     58     42     33      54     36       July      53     24     60     52     16     40     70     26     43       August      583     535     687     323     462     562     648     539     379       September      65     119     102     115     79     85     101     138     70       October      251     266     194     95     261     220     219     274     107       November      610     583     501     311     551     515     466     437     462       December      158     99     248     407     159     189     164     254     185       1930.      65     31     23     48     66     37        February      91     189     34     53     42     61     48     109     51       March      96     151     260     40     87     255     276     366     198	*******************************	 and the same of th	Bega.	Bemboka.	Bodalla.	Canberra.	Candelo.	Cobaro.	Moruya.	Pambula.	Tanja.	Tilba.	Lower Towamba.
April 35   20   460   174   39   43   433   128   81   128   128   138   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139   139	June July August September October November December 1930. January February March April	 	53 583 65 251 610 158 14 91 96 35	23 24 535 119 266 583 99  189 151 20	15 60 687 102 194 501 248 65 34 260 460	58 52 323 115 95 311 407 31 53 40 174	42 16 462 79 261 551 159 23 42 87	33 40 562 85 220 515 189 48 61 255 43	70 648 101 219 466 164 66 48 276 433	26 539 138 274 437 254 37 109 366 128	36 43 379 70 107 462 185  51 198 81	pts. 12 63 475 124 216 332 419 137 101 339 116 842	pts. 5 725 88 88 297 521 135 155 143 100 543

Following these excellent preparation-rains, ideal conditions for sowing and germination were experienced. The rainfall from August to December was regular and consistent, the germination of maize in experiment areas and on farmers' plots being very satisfactory; in fact, this good germination of the seed had a reactionary effect on hill-land, as here the dry autumn was more harmful to the heavier than the lighter stands. With the beginning of the new year drought conditions set in, and from what promised to be a wonderful season, a succession of failures, all on hill-land, was the outcome. The effect of the dry autumn was very little noticed on the alluvial flats,

where it is doubtful if yields were reduced at all, as sufficient moisture was conserved from the spring to bring the crops to maturity. On the hills it was a different story, for of the large area anticipated for grain, probably not more than 15 per cent. was harvested, and the average yield per acre was not more than 20 bushels.

Trials conducted by Messrs. N. C. Tarlinton (Cobargo), C. N. Squire (Bega), G. H. Black (Bemboka), E. Kelly (Canberra), and J. F. Anderson (Tilba Tilba) failed to produce satisfactory results owing to the unfavourable weather conditions.

#### The Variety Trials.

The results of the numerous variety trials confirm those obtained from similar trials conducted during the 1928-29 season.

YIELDS of Maize Variety Trials. Wyndham. (S. Robertson.) Lower Towamba. (W.R. Mitchell. Bate.) Candelo. (S. Solomon.) Towamba. W.R.Roberts.) Moruya. (A. Bartlett.) Scott.) Russell Bemboka. (F. W. Hand Pambula. (C. Cole.) Bodalla. Bega. (A. E. bus. 102 72 Funk's Yellow Dent 92 133 115 30 47 120 13 82 29 Leaming 129 54 5 71 87 124 118 15 Large Red Hogan 92 117 41 49 89 126 107 21 Iowa Silvermine 77 42 53 5 71 69 117 15 74 101 107 48 70 100 Fitzroy 18 Boone County White 65 113 97 38 5210 5295 128 16 Hickory King 60 88 92 365212 58 68 102 13 59 95 93Yellow Hogan 45 88 14. ... ... ... ... Pride of Hawkesbury 102 104 12 ••• ••• ... ... ... ... ... Ulmarra Whitecap 107 ••• ... ... Golden Beauty 37 46 5 55 64 103 10 ... ... Golden Superb 40 ••• ... • • • ,.. ... ... Large Goldmine 37 26 15 55 ... ... ... ٠., Kennedy ... 13 •• Hickory Goldmine Golden Fitzroy. King. Crossbred. Leaming. Beauty. Farmer's seed 69 106 58 110

Funk's Yellow Dent is the pre-eminent variety in this district for grain, especially so on the richer alluvial flat areas. This is not only confirmed by the results of these trials, but possibly more so by the various maize growing competitions conducted by local agricultural societies. The consistency with which Funk's Yellow Dent will yield on all the alluvial flats in this district is remarkable, especially so when it is considered that this variety is a fairly early maturer. It is the general consensus of opinion that on rich soils a late maturer will outyield an early maturer, but none of the late maturing varieties, with the possible exception of Large Red Hogan, is able to compete with Funk's Yellow Dent. Farmers of this district are very fortunate in having such an excellent heavy-yielding variety as this, and in any recommendations Funk's Yellow Dent, but to date has

not yielded as heavily as the latter, although its performances certainly indicate that it would prove an excellent substitute if Funk's Yellow Dent was not available.

Of the late-maturing varieties not one can compare with Large Red Hogan, which is certainly the most consistent and heaviest yielder in this group. Its lateness, however, is a drawback. When it is considered that in maturing it is about eight weeks later than Funk's Yellow Dent, it will be seen that it has little possibility of ousting the latter variety. Another variety that has promised well, particularly for the flats along the Kiah and Towamba rivers, is Boone County White. This variety, with its large cobs, appears to be able to yield more heavily in this portion of the district, as for two seasons now it has been on top in local variety trials.

As in the previous season hill-land trials were failures, and although one has been included in the table of results, the yields were so very low as to make recommendations impossible. The most popular variety locally for this type of land is Hickory King, and probably, with the exception of Golden Beauty, when required for green feed or silage, could not be bettered.

As regards varieties generally, the most important factor is to obtain good quality, true-to-type seed. For a farmer to start off with a poor sample of seed and hope to obtain a good type in a few seasons by selection is quite the wrong method; it is much better to pay a little extra or go to a little more trouble, start off with the best of seed, and aim at maintaining it at a high standard by careful selection.

#### The Manurial Trials.

In every manurial trial conducted superphosphate gave an increase in yield over no manure; certainly some of these increases were only slight, but it is not often that such conclusive results are obtained.

•	Moruya. (A. Bartlett.)	Moruya. (P. Hoolahan.)	Bodalla. (H. Jeif Bate.)	Bega. (A. E. Scott.)	Tanja. (J. J. Russell.)	Pambula. (W. Cole.)	(Pambula. (C. Cole.)	Wyndham. (S. Robertson.)		
Superphosphate (2 cwt.) Superphosphate (1 cwt.)	. 79 . 80 . 85	bus. 72 66 76 70 57	bus. 113 117 120 122 109	bus. 118 118 128 132 110	bus. 14  15 11 13	bus. 86 74 84 77 65	bus. 85 86 81 85 73	bus. 76 70 72 66 65		

YIELDS of Maize Manurial Trials.

NOTE.-M22 consists of equal parts of superphosphate and bonedust,

The trial at Moruya with Mr. A. Bartlett was conducted on a light sandy alluvial, and it has been noted before that superphosphate gives very little, if any, increase in yield on this type of soil; it was so again this season. Possibly it is owing to a certain lime deficiency, as in the other trial at Moruya on a heavy alluvial a decided increase in yield, due to the use of superphosphate, was obtained.

### Varieties of Tomatoes for Glass-house Culture.

WITH NOTES ON POLLINATION.

J. DOUGLASS, H.D.A., H.D.D., Agricultural Instructor.

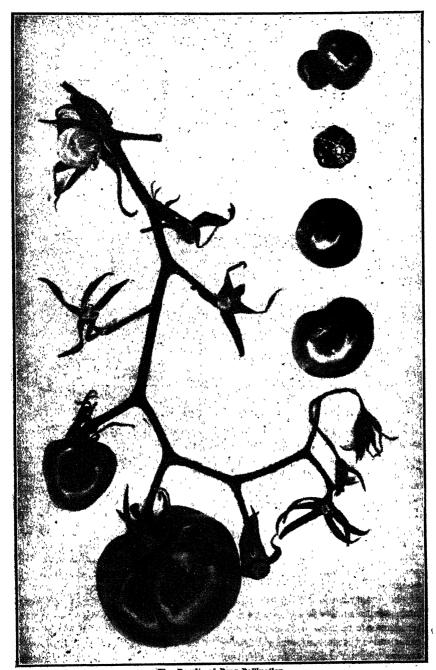
Tomato-growing under glass is more or less a new venture in New South Wales. Little reliable information is on hand regarding suitable varieties of tomatoes to grow in this State, while those growers in South Australia and other States who have been engaged in the industry for a longer period still grow one main variety and have had no experience with other types. It was therefore thought fit to place on record the experiences and results of trials and observations made since the industry started in this State.

The chief aim of all glass-house growers is to obtain a heavy yield. This factor is somewhat controlled by the pollination and yielding qualities of the variety grown. It is found that with many varieties a number of the flowers fail to set fruit under glass owing to not being pollinated. Other varieties are unable to ripen pollen under glass-house conditions.

The male and female portions of a tomato flower are both contained in the one flower; the male portions, or pollen sacks, are arranged around the female (pistil) portion of the flower. Normally when the pollen is ripe the bags burst and the pollen grains drop around the pistil; some of these adhere to the sticky end of the pistil and send forth pollen tubes to the cvary where pollination is completed.

Apart from the temperature and humidity conditions, which to a great extent control pollination, the structure of the tomato flowers is also responsible in some degree for the small percentage of flowers pollinated. Some varieties have the female portion or pistil of the flower protruding inch beyond the ends of the pollen sacks, while others have a short, stubby pistil imbedded in the sacks. When the bags burst it is natural that the flowers with short pistils will have a much greater chance of being pollinated than those with long ones.

The best pollinating or setting varieties under glass-house conditions belong to the "Chinese" group, the better known varieties of which are Chinese Dwarf, Lascott Dwarf Red, Bendigo Dwarf Red, Atlantic Pride, and Market Favourite. An examination of the structure of all these varieties will show that the pistil is well covered by the pollen bags. All these varieties are either dwarf or semi-dwarf growers, which is a distinct advantage under the conditions existing in small glass-houses. The glass causes excessive growth in all varieties, hence tall growers, such as Earliana, Bonny Best, and other popular varieties, grow to a great height.



On Left.—Fruit bunch on which only one fruit has pollinated; the remainder have reached approximately maxim m size.

Top Right.—Undereloped unfertilised fruit.

#### A Variety Trial.

A small variety trial was conducted during the 1929 season in co-operation with Mr. M. Short, of Harbord. This grower had a house 100 feet by 30 feet constructed on very light, sandy soil in close proximity to the sea. Mr. Short liberally used cow and artificial manure, hence the plants were grown under relatively good conditions. In this locality the temperature at night does not fall too low, and the day temperatures were kept down by means of ventilation and the large size of the house. Even temperatures greatly assist the pollination of the flowers. It will thus be seen that the varieties grown at Harbord had everything in their favour for perfect pollination, and in considering the results of this trial these facts should not be overlooked.

		Average Yield per Plant.								
Date of Picking.	Bonny Best.	Chinese (Forbes).	Chinese (D. A. Sel.).	Early Winner.						
15th October	lb. oz 0 5 1 13 1 13 2 4½ 1 2	lb. oz. 0 1 0 12 1 14 1 8 0 8	lb. oz. 0 2 1 2 0 14½ 1 14 0 13	lb. oz. 0 5 1 8 0 15 1 2 0 6						
Total	7 51	4 11	4 131	4 4						

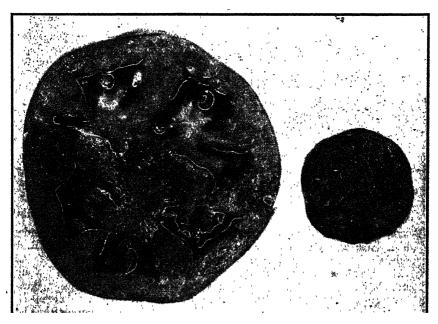
YIELDS of Variety Trial.

#### Notes on the Varieties.

The Chinese varieties belong to the first early group and under Harbord conditions showed no difficulty at all in setting fruit from practically 100 per cent. of the flowers. Various growers have made selections from "Chinese," the Department of Agriculture's selection used in the experiment being one selected for yield, improved shape and quality. The unselected types have very wrinkled, irregularly-shaped fruit of poor quality. The fruit is usually hollow, with a tough skin and has little flavour. It might be stated, however, that these always command about double the price of the Queensland tomatoes on the Sydney market. Another undesirable feature of this group is the setting, on each bunch, of an abnormallyconstructed flower, called by growers a "stag" or "buck." If allowed to mature this fruit grows to a very large size at the expense of the rest of the fruit and is so badly shaped and poor in quality as to be of very little commercial value. The varieties in this group also have the characteristic of retaining a large number of flowers that fail to pollinate. In other varieties the unfertilised flowers usually drop off. In the "Chinese" strains the unfertilised fruits do not develop much larger than 1 inch in diameter, are usually of poor flavour and of little commercial value.

Bonny Best.—As a result of this trial and from observation of the behaviour of this variety in other houses it can be safely recommended for glass-house culture under conditions similar to those at Harbord. Bonny Best will be found totally unsuitable for houses in cold districts or on heavy soil, and where the small standard house is used.

This variety is now well known as an outdoor variety, one of the outstanding features being its very excellent quality. Under good glass-house conditions the quality is, if anything, improved. The fruit is very even in size, is smooth, and of perfect colour and quality. Unfortunately a good deal of attention has to be given to the pollination of this variety, and if prolonged wet, cold weather is experienced, some flowers will fall. The energy of the plant is then put into the fruit that does pollinate, resulting in abnormally large fruit.



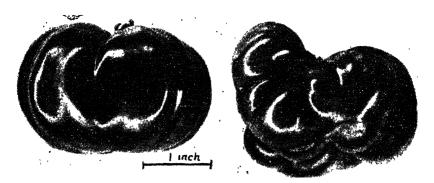
Cross-sections of Normal and Undeveloped Unfertilised Fruits.

The unfertilised fruit has no seed.

Mr. Short had little difficulty pollinating this variety. It was observed, bowever, that any flowers that failed to pollinate dropped off the plants.

Bonny Best under glass is perhaps the most vigorous grower that could be imagined. Pruning has to be carried out more often than with most varieties owing to the persistency of the lateral growth. These normally only grow between the main stem and the leaf stem, but under glass the normally dormant buds along the mid-rib of the leaf and the flower branches put forth vigorous lateral growth.

The average of 7 lb. 5½ oz. per plant produced by Bonny Best is an excellent yield. This would be equal to a yield of 214 half-bushel cases from a standard house of 700 plants.



Chinese Varieties, Showing Variation in Different Strains. The fruit on the left is of good, and that on the right of undesirable shape and quality.

Early Winner is an Earliana type that did not come up to expectations in this trial. Great difficulty was experienced in getting the flowers to set. Early Winner was also a very vigorous grower, although much finer than Bonny Best. The fruit is of good shape and quality, but on removing the stalk a hollow is left which is noted by most buyers. Further trials are necessary before any conclusive recommendations can be made regarding this variety.

South Coast Fodder Conservation Competitions, 1930.

RECORD entries were received for the competitions conducted in the Camden, Albion Park and Dapto districts. The entries were judged by Mr. R. N.

Makin, Senior Agricultural Instructor for that part of the State.

In the Camden competition the trench silo was largely used and is found found very economical in the Wianamatta shale country. Messrs. Porter Bros. won the competition with a plentiful supply of excellent lucerne hay, ensilage, and grain. No other competitor in the Camden competition had any grain to include in his entry, the grain crops having failed on account of the dry weather.

Mrs. Gower carried off the Albion Park competition with the substantial margin of 22½ points separating her from the next highest competitor. Her farm carried good supplies of maize grain, lucerne and oaten hay, and silage, while the milking machines, separators, chaffcutter, &c., were all operated by electricity, which Mrs. Gower is quite convinced is more economical than

power generated by oil engines.

Good supplies of silage, lucerne hay and maize grain enabled Mr. E. T. Evans to carry off the honours in the Dapto competition. Mr. Evans had only recently completed the building of an up-to-date reinforced concrete sile, to the location of which it was apparent very careful study had been given.

#### Tomato Varieties and Pulping Quality.

HIGH GRADE PULP MEANS INCREASED SALES.

F. C. ELSWORTH, B.Sc., A.A.C.I., Chemist, Messrs. Henry Jones and Co., Ltd.

LARGE areas of tomatoes are cultivated in various parts of the State to supply the requirements of tomato pulping factories. Up to the present little attention has been paid to the pulping qualities of the various varieties, and in view of the necessity of securing uniformity of product in conjunction with highest quality, it was considered desirable to investigate the suitability or otherwise of the varieties in general cultivation.

The fresh fruit for these determinations was grown at Bathurst Experiment Farm and the weighing and crushing undertaken at the Co-operative Factory. The boiling and pulping were carried out at the Experiment Farm, and the resultant produce was then submitted to examination at the laboratory of Messrs. Henry Jones & Co., Ltd., Darlington. I desire to acknowledge the help afforded by the staff of these institutions, and by Mr. A. J. Pinn, Special Agricultural Instructor.

The report of these investigations should be of particular interest to growers and pulp producers alike. It is hoped that more attention will be given in the future to the cultivation of better-class varieties, for it is quite possible that shortly factory managers will refuse to accept inferior varieties. High quality pulp means increased sales, which, in the end benefits the grower of the fruit by increasing the demand for his product.

The experiments were conducted to determine the following points of suitability of tomatoes for sauce manufacture:—(a) Total solid content; (b) soluble solid content; (c) amounts of skins and seeds; (d) effect of irrigation upon solid content.

The procedure adopted was to pulp a given weight of each variety of tomatoes by the ordinary factory process, boil for half an hour, and then dilute the resultant pulps all to the same volume. This pulp was sieved by a rotary sieve, and the total skins and seeds extracted, being of approximately the same moisture content, were weighed for comparison. The pulps then obtained were compared for colour, and representative samples were taken and tested for (a) soluble solids (by Refractive Index); (b) total solids (by official method, M.A.O.A.C.). In all cases 70 lb. of tomatoes were made into 8 gallons finished pulp, or, if smaller weights of tomatoes were taken, a corresponding yield of finished pulp was arranged.

The results are tabulated below:-

Variety.	Refractive Index (20 deg. cent.).	Percentage of Total Solids (M.A.O.A.C.).	Weight of Skins and Seeds.	Percentage of Skins and Seeds.
Columbia Norton Norduke Marglobe Repeater Chalk's Early Jewel Bonny Best Money Maker Feilen's Feilen's (Non-irrigated) *King Humbert	 1·3416/20 1·3426 1·3436 1·3413 1·3398 1·3405 1·3405 1·3415 1·3403 1·3421 1·3390	4·73 4·62 4·26 4·95 4·35 4·25 4·40 4·30 4·53 4·70 3·50	0z. 19·5 24·5 25·0 21·0 14·0 20·5 20·5 24·2 27·0 26·0 53·5	1.7 2.2 2.2 1.9 1.3 1.8 2.2 2.4 2.3 4.8

M. \* In this case the fruit was grown at Richmond, and was included chiefly to afford a comparison of larger quantity of skins and seeds of the small-fruited variety with those of the larger-fruited varieties grown at Bathurst.

#### Conclusions.

Solids.—Comparing all tomatoes grown on irrigated ground, the following list can be compiled in order of highest solid contents:—

Soluble Solids.	TOTAL SOLIDS.
Norduke.	Marglobe.
Norton.	Columbia.
Columbia.	Norton.
Money Maker.	Feilen's Selected.
Marglobe.	Bonny Best.
Bonny Best.	Repeater.
Chalk's Early Jewel.	Money Maker.
Feilen's Selected.	Norduke.
Repeater.	Chalk's Early Jewel.

Skins and Seeds.—The percentage of skins and seeds did not vary sufficiently to give any variety preference over any of the others, except in the case of King Humbert.

Effect of Irrigated Ground.—The two samples of Feilen's Selected, grown on irrigated and high ground, respectively, showed a higher percentage of solids when grown on high ground.

Colour.—In order of brightest red colour the varieties were:—Marglobe, Columbia, Norton, Norduke, Bonny Best, Money Maker, Feilen's, Chalk's Early Jewel, Repeater. Repeater must be classified as being very inferior with regard to colour.

Core.—The following varieties had very little core:—Marglobe, Bonny Best.

It is not possible to arrive at the true value of any variety from the appearance of the fruit. In the case of the Repeater variety one might reasonably expect a satisfactory pulp, but on cooking the poor colour is

quickly manifest. Apart from colour, the percentage of total solids is of great importance to the manufacturer, and on the results obtained it will be noted that Chalk's Early Jewel, Norduke, Money Maker, and Repeater give a low yield. The culture of these varieties for pulping purposes should be curtailed in favour of such well-known varieties as Marglobe, Columbia, Norton, and Bonny Best, for instance, which give a higher yield of total solids and at the same time produce a pulp with a desirable colour.

#### BEETROOT TRIALS AT BATHURST EXPERIMENT FARM, 1929-30.

Commenting on the results of the beetroot variety trial carried out at Bathurst Experiment Farm, Mr. G. T. Dawson, Experimentalist at that farm, states that although Nonpareil gave the highest yield (4 tons 11 cwt. 2 qr. 2 lb.) of best quality beetroot, it was very uneven in maturing, which is an undesirable feature with any market garden crop, the land being occupied for so long by the one crop that it interferes with the cropping system. Nonpareil on this account, would be more suitable for the home garden. Rapid Red, another variety under trial matured much more evenly, producing roots of very good quality. It is considered better than Nonpareil for market gardens. Kremton's Combination is an even maturer and produces a good sample of beet, although not yielding as well as the two varieties already mentioned; it will be tested further. Egyptian Turnip Rooted, the standard variety for the State, has deteriorated somewhat since first introduced, and results obtained at Bathurst last season were unsatisfactory.

In the fertiliser trial, superphosphate, basic superphosphate, and a number of fertiliser mixtures were tried out in comparison with check plots on which no manure was used. Under the conditions of climate, &c., which prevailed at Bathurst farm last season, a heavy dressing (372 lb. per acre) of a mixture of six parts of superphosphate, one part of sulphate of ammonia, and one part sulphate of potash gave by far the most profitable results, the roots harvested from this plot being much larger than from the other plots and of very good quality. The increased net return per acre due to the application of the above fertiliser mixture was £46 4s. 5d. as against the next highest increase of £10 5s. 2d. per acre in the case of the plot receiving a mixture of six parts of superphosphate and one part sulphate of ammonia at the rate of 326 lb. per acre.

#### POTATO GROWING POSSIBILITIES ON SOUTHERN MONARO.

Basing his claims on the results of trials carried out under his supervision on the Southern Monaro, Mr. John L. Green, Agricultural Instructor, with headquarters at Bega, points out that there are distinct possibilities in potato growing in that section of the State. Very little virus or other disease is found in the crops in that district, and fair yields are the rule. The red soils of the Southern Monaro are ideal for potatoes, and there is an excellent local market close at hand in the coastal towns.

#### TUBERCLE-FREE HERDS.

Of the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.		Number tested.	Expiry date of this Certification.
James McCormick, Tumut		91	5 1930
Wolard College Orenge		. 8	19 ,, 1980
Riverstone Meat Co., Riverstone Meat Works, Riverstone	***	115	27 ,, 1930
J. F. Chaffey, Glen Innes (Ayrshires)			29 ,, 1930
J. L. W. Barton, Wallerawang		18	9 Oct., 1930
Blessed Chanel's Seminary, Mittagong		1 -	25 1930
H. A. Corderoy, Wyuna Park, Comboyne (Geurnseys)		1	1 Nov., 1930
New England Experiment Farm, Glen Innes (Ayrshires)		1 00	2 1000
		1 0-	2 1000
		1 40	11 " "00"
J. Davies, Puen Buen, Scone (Jerseys)			
Department of Education, Brush Farm, Eastwood	•••	28	
Lunacy Department, Callan Park Mental Hospital		1 95	
Bathurst Experiment Farm (Jerseys)		0.4	1 Dec., 1930
Lunacy Department, Morisset Mental Hospital			7 Jan., 1931
C. J. Parbery, Allawah, Bega	•••	88	7 ,, 1931
Kinross Bros., Minnamurra, Inverell (Geurnseys)	•••	72	11 ,, 1931
New England Girls' Grammar School, Armidale		21	16 ,, 1931
Lunacy Department, Parramatta Mental Hospital	•••		23 ,, 1931
W. M. McLean, Five Islands Rd., Unanderra		73	
Miss Brennan, Arrankamp, Bowral		10	19 Feb., 1931
Department of Education, Yanco Agricultural High School		33	1 47 1041
G. A. Parish, Jerseyland, Berry			27 , 1931
Lunacy Department, Kenmore Mental Mospital	***	76	100
Hawkesbury Agricultural College (Jerseys)		1 700	1 Mar., 1931
St. Joseph's Girls' Orphanage, Kenmore		10	0 4004
		3	4 4001
Ot Taxable Commant Dames I alexat Carellines	•••	4	4 7007
	•••	7	
St. John's Boys Orphanage, Goulburn	•••		
Marion Hill Convent of Mercy, Goulburn		10	6 ,, 1931
Cowra Experiment Farm	•••	29	6 ,, 1931
Riverina Welfare Farm, Yanco	•••	60	6 ,, 1931
Wilkins, James, Jerseyville, Muswellbrook	***	51	12 ,, 1931
Tudor House School, Moss Vale	•••	8	21 ,, 1931
H. F. White, Bald Blair, Guyra (Aberdeen Angus)		202	3 April, 1931
Grafton Experiment Farm (Ayrshires)	• • • • • • • • • • • • • • • • • • • •	180	5 ,, 1931
Department of Education, Hurlstone Agricultural High School	***	45	10 , 1931
Navua Ltd., Grose Wold. via Richmond (Jerseys)		13	29 , 1931
Australian Missionary College, Cooranbong	***	45	30 . 1931
J. P. McQuillan, Bethungra Hotel, Bethungra	***	6	1 May, 1931
George Rose, Avimerton	***	4	28 ,, 1931
William Thompson, Masonic School, Baulkham Hills	***	48	28 ., 1931
Department of Education, Gosford Farm Homes	***	30	3 June, 1981
F. C. Kershaw, Macquarie House, Macquaric Fields		71	
D Tibelbion Comidenas Done		114	0 " 700"
(1) Januaria 3 Famely 1 Transital	***	42	
	•••	40	25 ,, 1931
	•••		23 July, 1931
4 Cham Dannington (2017) in a Ct. and a con-	•••	4	26 ,, 1981
E D Dower Mundowsh Dowleville (Commonwe)	•••	122	9 Aug., 1931
	•••	22	13 ,, 1981
	***	55	14 ,, 1931
Sacred Heart Convent, Bowral	•••	12	20 ,, 1931
St. Patrick's College, Govlburn		8	22 1931
Walter Burke, Bel'efaire Stud Farm, Appin (Jerseys)		46	22 1931
n. w. panton practey, sherwood Barn, Moorland (Jerseys)	***	81	12 Sept., 1931
H. W. Burton Bradley, Sherwood Farm, Moorland (Jerseys) J. F. Dowe, "Woolonol," Tamworth		42	19 ,, 1931

-Max Henry, Chief Veterinary Surgeon.

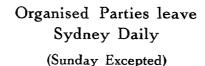
Mr. G. D. Rousseau, of Southern Rhodesia, writes: "It may interest you to hear that the 'Farmers' Handbook' is what I am guided by out here."

Agricultural Gazette of N.S.W., October 1, 1930.



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#### Mallee Farming.

[Continued from page 691.]

E. S. CLAYTON, H.D.A., Senior Experimentalist.

#### STARTING THE MALLEE FARM.

THE selection of the site for the home buildings, dams, &c., is the first consideration, and it should be made with a view to the efficient subdivision of the farm later on.

#### Rolling.

Many farmers favour getting the first rolling done by contract, but there are some arguments against this, and each settler should decide according to his financial position. During the first year, it is advisable to roll a con-



A Serub Roller at Work.

siderable area, but not such a large tract as to be troublesome later on. It is well to remember that the settler has to keep the suckers down for the first few years, and if too large an area is rolled there is a danger of the suckers getting ahead in the second or third year. Some adopt the system of rolling a sufficient area to sow that season and also provide land to be fallowed for the following season; this is an excellent scheme. If 500 acres are rolled 250 to 300 acres could be sown and the balance fallowed for the following season.

All the mallee up to about 4 inches in diameter is rolled. A suitable log or metal roller such as an old boiler may be used. It is necessary to construct the roller with a superstructure, pole and wheel, so that it can be drawn along with the horses or tractor working in the rolled

portion while the roller draws over into the standing mallee. diameter and length of the roller are best decided by the class of mallee to be cleared. It should not, as a rule, be longer than 10 feet, and a team of eight horses or less is sufficient to draw it. Bullocks are preferred for this work, and should be used when available, as they are steadier than horses, and their slower but more consistent pull is more effective; also they are not so likely to get injured. From twelve to sixteen bullocks usually constitute a team, and they are capable of rolling about 60 acres in a week. When horses have to be relied on, one of the secrets of success is to have a sufficient number hitched to the roller so that they can walk along freely with only a slight pull. For example, if the width of the roller and the class of mallee are such that four horses could do the job, it would probably be advisable to put in six horses. If this is done there should be fewer accidents, and the faster pace will save a considerable amount of time. In this hazardous work horses should never be overloaded, as it is when they are floundering about in heavy going that they get injured.

A log about 2 feet 6 inches in diameter is often used for mallee rolling. Such a roller is more effective in rolling out the stumps by the roots, but is troublesome as it is more inclined to get hung up on strong stumps than is a roller of greater diameter. A large iron roller is preferable in some classes of mallee. If a log is to be used, a hollow one should be selected, and also one that is tough, with the grain twisted so that it will not split under heavy work. The stouter the mallee the larger should be the diameter of the roller. For big mallee an old boiler 4 feet or so in diameter makes the best roller. For Whipstick, Broombush, or Blue mallee the log roller is preferred.

It is usual to cut a track along the edge of the area to be rolled to provide a clear path for the horses. Rolling mallee is an exacting undertaking, and requires a certain skill on the part of the driver and steadiness in the horses, which only come from experience. When inexperienced men are on the job, men and horses are easily injured. No definite rules can be laid down to guide a settler under all and every situation, which makes it desirable that only those who have either had some experience of mallee country or who are good horsemen and bushmen with reliable judgment should undertake the work.

It is necessary to have one man working in front of the roller to nick all trees that would be too thick and tall to roll satisfactorily. If such clumps or large single specimens are not nicked, they break off too high up the stem when the roller strikes them and runs over them, and then have to be cut down level with the ground after the mallee is burnt—and as the burning toughens the timber the work is then much harder. Trees to be nicked should be cut as low as possible (right at the ground level), and on the side farthest away from the roller. It is advisable to nick anything over 6 inches in diameter, and sometimes if the mallee is dense and occurring in big clumps it may even be advisable to nick trees of even less than 6 inches in diameter. Occasionally scattered ironbark trees or

other trees of 1 foot or more in diameter and 30 feet or more high occur in mallee. These are sometimes left untouched to provide shade for stock later on. This is a very commendable practice, as a few trees left in the paddock are of great value as shade in this country.

The roller is intended to roll down all the standing timber, and, although many of the trees are snapped off, if the roller is of a size and weight suited to the class of mallee, it should roll in such a manner that many whole clumps of roots are levered out of the ground. This rolling out of the



Eull Mallee Cut Axe High to Facilitate Burning.

A method adopted in South Australia.

stumps is the desired action of the roller, and if it is simply snapping off the trees without rolling the stumps out it is not doing the work correctly. A fairly short, heavy roller of no great diameter is very effective; such a roller hits a clump close to the ground and with considerable force, and is therefore effective in bumping stumps and roots out. A larger roller on certain mallee would simply ride freely over many stumps without levering them out.

#### When to Roll.

Mallee should be rolled in the winter to get the best results. When the ground is moist the roller has a much greater chance of rolling the clumps of stumps and roots out of the ground. When it is dry there is little chance of bringing about the desired result, the trees tending to break off near the ground. Mallee cannot be burned before 1st March on account of the danger

of bush fires. It is necessary to have the trunks of the trees sufficiently dry to burn well by 1st March, otherwise the fire will not be satisfactory and a good deal of picking up, which is expensive, will be necessary.

It is found that July, August, and September are the best months for rolling—in very dry years rolling should be finished before the end of August, and in normal years before the end of September. If mallee is rolled late the larger stems do not burn well, and a good deal of hand labour will be necessary to remove or burn them. All the mallee that is not broken by the roller ("springbacks") should be cut, otherwise it will not die. A great deal depends on the success of the burn. If a good burn has been obtained the land is not only cleaned up well, but it gives the mallee clumps a great check and the subsequent suckering will not be so vigorous.



A Scrub-log at Work in South Australia

The cost of rolling varies, of course, but for Whipstick maller it ranges from 10s. to £1, and more for larger mallee.

Large Bull mallee is sometimes cleared by scorching the butt in late spring and then completely burning down in the autumn. This is considered an effective means of handling mallee of this type, as in many cases the stumps and root clumps burn right down below ground level and reduce suckering to a minimum. Large Bull mallee which cannot be rolled is generally cut are high in July and August so that the logs can be rolled against the stumps for burning. If such clumps are cut at ground level, even although the logs are packed over the root clump, the latter will not be burnt out satisfactorily. When the former method is adopted the large toots burn out much better.

#### The Scrub-log.

A new method of mallee destruction is giving satisfaction. Instead of rolling the scrub it is knoced down by a scrub-log of special construction. The implement is about 24 feet wide and is drawn along by a tractor or a team of bullocks at each end. The base consists of two logs each 9 inches in diameter and 12 feet long with a supporting log of 9 inches diameter and 8 feet long attached immediately behind them. Heavy bolts are used to join these logs. A superstructure is bolted onto this heavy base and given a cant forward of about 2 feet 6 inches. It is about 4 feet 6 inches high and the supports are about 6 inches in diameter with the top log about 15 feet long.

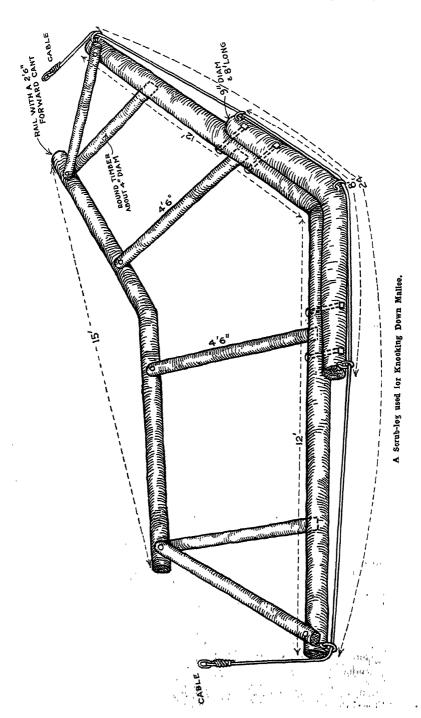


Green Maliee Country after a Bush Fire. Clearing has been rendered more difficult by the fire.

The scrub-log will take single-stemmed trees up to 15 inches in diameter, but in ordinary mallee it will work in timber about 2 to 6 inches in diameter and has the great advantage of pulling out about 40 per cent. of the stumps. This implement is likely to revolutionise the clearing of virgin mallee country.

#### Burning.

Before firing it will be necessary to make a good firebreak on all sides of the rolled area; this should be at least a chain wide and can be prepared by picking up all the mallee from a strip about 5 or 6 yards wide on the outer edge of the area. The same can be done on the inner edge of the chain strip and both clean areas can be ploughed to form a firebreak. Then



on a suitable cool day early in the season, with a favourable wind, the mallee between the two strips of ploughing can be burnt, thus leaving a break of 1 chain. After a good firebreak has thus been made all around the area, a suitable day for burning the main area is awaited. March is a good month for checking suckering, but it is risky to wait too long, as rain may occur and spoil the burn, but it is worth waiting until the first suitable day in March. Four or five men will be necessary to assist in the lighting and to keep the fire from spreading. If burnt in February, the sap is still rising and the fire is not so effective in checking shoots should rain fall soon after the burn. The suckers on February-burnt scrub often require slashing before the wheat crop is harvested, but this again depends largely on the district and the weather. The fire is lighted first on the opposite side to the direction from which the wind is blowing. It is lighted from the centre of this side working in both directions. The two adjoining sides are then lighted and finally the windward side. The fire, of course, must not be allowed to escape or great damage may be done.

#### Preparation for the Crop.

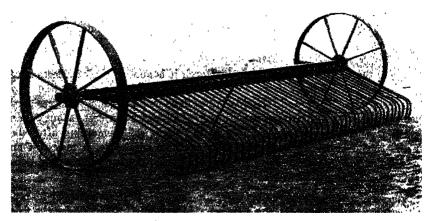
After the rolled mallee is burnt in March it is generally advisable to have any stumps which show above ground knocked off with an axe, so that they are level with the ground. If this is not done endless trouble is occasioned by breakages to the farming machinery. This operation costs about 5s. an acre: it may also include picking up the sticks still remaining after the fire. If the burn has not been as successful as desirable, it may cost an additional 5s. per acre to have these sticks picked up, but after a good burn this expense is not incurred.

As soon after burning as possible the land should be cultivated in preparation for the sowing. Some farmers do not cultivate at all for the first crop, merely drilling in the seed, but it is better in the long run to endeavour to get as good a crop as possible the first year; therefore a certain amount of cultivation is advisable. The better the stubble in this first crop the more likelihood of checking the suckers so that they give very little trouble later. The cultivation destroys a large number of small fibrous roots in the surface soil, and some of the larger surface roots are severed also. This is a great advantage, as the mallee roots rob the crop of moisture and plant-food, especially in dry seasons. A light cultivating plough, skim plough, disc cultivator, or springtooth cultivator can be used for this initial working, but whatever implement is chosen it should be set to go no deeper than 2 inches, otherwise the land will not be sufficiently consolidated to grow the crop satisfactorily. About 45 lb. of seed and ½ to 1 cwt. of superphosphate per acre are required.

After sowing it is advisable immediately to commence fallowing the remainder of the burnt area. In this case, ploughing is advisable. A depth of 4 inches or less if possible is quite satisfactory, as at this depth a large number of surface roots are cut, which causes a severe check to the growth of suckers. Very little draught should be put on the plough so

as not deliberately to pull out too many stumps at this stage. It is considered preferable to kill the stumps in the ground and plough them out later, rather than endeavour to get a large number out with the first ploughing. The fallow can be cultivated in the spring with a skim plough, or rigid or springtooth cultivator, but the depth should not exceed 2 inches. It should be worked again as required until sowing time.

When the fallowing is complete at the end of the winter, another 200 or 300 acres of scrub should be rolled and the "springbacks" cut. This is to be burnt the following March and cropped the same season. A stripper and winnower is preferable for harvesting, as a header or harvester is some-



A Stump-jump Fire Rake.

what out of place on new mallee farms. Some mallee farmers do not cut any hay the first year, as the crop is light and a good stubble burn is of extreme importance. They consider it preferable to strip all the crop for grain, burn all the stubble and feed the horses on cocky chaff supplemented with purchased oats, bran and chaff. If possible, the stubble should be knocked as flat as possible to keep the fire low so that it will more effectively scorch the mallee stumps and suckers. To bring about this result a roller can be fixed under the comb of the stripper. A 2-inch or 4-inch pipe fastened to the stripper will usually roll the stubble satisfactorily; sometimes, however, it causes delays by catching in the stumps and may prove unsatisfactory under certain conditions. The stubble should be burnt in March. A fire rake may be necessary if the stubble is very thin.

In the second year the land which grew the first year's crop can be cultivated and sown with oats (50 lb. seed per acre) using superphosphate (2 to 1 cwt. per acre). When this is stripped the stubble should furnish a very satisfactory burn, resulting in the killing of a good proportion of the

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suckers. The suckers on the new land that was fallowed the first year should be slashed in March and burnt with the aid of a fire rake; the crop can then be drilled in on comparatively clean land.

A system can then be followed whereby about 200 to 300 acres of wheat are grown on fallow or new land each year, together with 200 or 300 acres of oats sown on the previous year's stubble, until the mallee has all been killed. It is necessary to concentrate on the destruction of the suckers and the land should be fallowed or cropped and not left out of cultivation until the suckers on it have been killed.

#### A Summary of the Cropping Operations.

First Year.—Roll 400 to 500 acres; sow 200 to 300 acres with wheat and fallow the remainder.

Second Year.—Sow 200 to 300 acres of oats on the first year's wheat stubble, and 200 acres of wheat on the fallowed land; roll 200 acres of standing mallee.

Third Year.—Sow 200 acres of the previous year's wheat stubble to oats, and 200 acres of wheat on the newly-rolled and burnt land; fallow the first 200 acres—the area under oats the previous year.

Fourth Year.—Sow 200 acres of the previous year's wheat stubble to oats, 200 acres of the old fallowed land to wheat, and also 200 acres of the newly-burnt land to wheat; fallow the 200 acres previously under oats.

Fifth Year.—Sow 200 acres of the previous year's wheat stubble to oats, 200 acres of the old land which was fallowed to wheat, and 200 acres of the newly-burnt land to wheat; fallow 200 acres previously under oats.

A somewhat similar system to this is popular in South Australia and is adopted with slight modifications by many of the most successful mallee farmers.

It is advisable not to roll down new country until satisfied that 'the suckers on what has already been burnt can be dealt with. Clearing small additional areas at a time and handling them thoroughly is preferable to running over a large area. The farmer can cut his own hay from the oat crop each year so that the only time he is without home-grown feed is during the first year.

The system outlined above, if properly followed, should obviate much of the drudgery of shoot cutting and should ensure the harvesting each year of as good a crop as possible under the circumstances.

The mallee attracts men with little capital and sometimes small experience, generally because of its low initial capital value and easy clearing. New settlers are often over-eager to knock down as much standing scrub as possible, as the scrub is considered to be costing the rental, value of the land it occupies and giving no return. This is so, but it is well to ignore this aspect, because if too large an area is rolled and badly cropped with subsequent suckering, the final loss may be much in excess of the lost rental value of the land.

Continuous cropping in the first few years is not advisable. It does not destroy the suckers as well as when a fallow is introduced into the system quite early in the development of the block. The stubble grown on continuously cropped land is light and does not provide a sufficiently hot burn to scorch the shoots satisfactorily. It is found that new land can be satisfactorily fallowed. The cultivating machinery even destroys many of the suckers, thus reducing the amount of hand work, and the stubble burn on fallowed land is much more effective than when the land has not been fallowed. It is well to remember that on new mallee country it is impossible to grow both wheat and suckers satisfactorily on the limited amount of moisture available in the soil.

Many novel methods of destroying suckers have been tried, especially in South Australia, but unfortunately up to the present very little success has attended these efforts.

(To be continued.)

#### Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

The Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36A, G.P.O., Sydney, not later than the 12th of the month.

Maize— Fitzroy Large Goldmine Leaming	***	Manager, Experiment Farm, Grafton P. Short, "Moore Park," Armidale Manager, Experiment Farm, Grafton.
Lucerne Seed	***	W. J. Scott, Allengrove, Baerami Croek, via Denman
Sorghum— Sumac White African Saccaline Collier	•••	Manager, Experiment Farm, Bathurst Manager, Experiment Farm, Wollonghar Manager, Experiment Farm, Grafton Manager, Experiment Farm, Grafton.
Tomatoes— Bonny Best. (. Chalk's Early Jes	vel	Manager, Experiment Farm, Bathurst. Manager, Experiment Farm, Bathurst.
Watermelon— Angelino	•••	C. J. Roweliffe, Old Dubbo Road, Dubbo.

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

#### Forecasting of Crops.

A. A. WATSON, Director of Marketing.\*

TURNING to the dictionary, I find among the definitions given of "fore-casting" one that admirably portrays its purpose so far as concerns this address—so far, indeed, as the whole intent of the word is concerned and as it is used in the Marketing of Primary Products Act. The definition I refer to speaks of forecasting as the act of "calculating beforehand, so as to provide for."

Our aim, when forecasting crops, is to issue figures calculated from the most complete data available, with the object of enabling the farmer to provide for the most effective marketing of his crop. In other words, the Department aims in this, as in other ways, to help the farmer to end the era of "blind marketing," with its record of unnecessary disappointments, avoidable losses and failures that need not have been.

Not for one moment do I suggest that the forecasting of crops can be raised to that pitch of perfection when the forecast will always be justified by the event. Hail on the eve of picking will strip an orchard, wind and rain lay flat the wheat that awaits the stripper, bush fires and floods that may come in the "twinkling of an eye" will bring disaster to the most promising crops—these or other calamities, if they occur after the forecast, will necessarily affect its accuracy. It frequently happens, however, that visitations of the kind, calamitous though they be to the growers concerned, are not widespread enough to cause material inroads upon the production of the State. New South Wales, it should be remembered, is a very large place in which widespread eleventh-hour failures of crops are too rare to be regarded as reducing the value of soundly-based crop forecasts. It only remains to add here that the need for such forecasts is widely recognised, and that the purpose of this address is to give some account of the principles that are guiding us, the methods we have adopted, and the progress we have made and hope to make in this truly great and national endeavour.

As a further introduction to this subject I feel that I cannot do better than quote from an official resumé of the practice pursued in relation to forecasting in the United States of America. The plan now operating in that country is said to have been in process of development since the year 1871, and it may safely be assumed that, in the course of fifty-nine years, the American practice has run through a full cycle of climatic and other influences that affect products of the land. Be it said, also, that both Government and farmers of that richly-endowed territory have unitedly established a system of crop forecasting which amply justifies the attention of Governments and farming communities in other parts of the world.

<sup>\*</sup> An address delivered at the Eighth Annual State Conference of the Agricultural Bureau of New South Wales.

In the official report referred to, the methods of collecting data for crop reports in the United States are interestingly described. The data, we are told, "are obtained through a special field service, a corps of State statistical agents, and a large body of voluntary correspondents." Space does not permit of a detailed description of the system, and what follows is but a brief account culled from the report with a view to rapid presentation of essentials only. So far as practicable, I employ the actual verbiage of the report.

"The statements of reporters are expressed in figures instead of words, the figures indicating the percentage of full yields expected under existing conditions." As a consequence, "the reports are capable of tabulation and mathematical computation and of such interpretation as to afford definite and comparative results." Prior to the adoption of this system "estimates were indefinite and intangible, were expressed in words as variable in meaning as the personalities of those using them, and incapable of translation into any form of statement lending itself to clear interpretation or intelligent comparison." It is claimed for the method of reporting in figures that "it is admittedly the best, in fact, the only one by which growing crop conditions can intelligently be shown," and that, "when the individual reports of large numbers of well-informed persons are properly rendered, their consolidation cannot fail to indicate existing prospects with approximate accuracy." The report is careful to point out, however, that "there can be no such infallible judgment, no such exact knowledge of the promise of present conditions as to enable anyone, no matter how intelligent or wellinformed, to indicate by figures, or by any other manner, precisely what relation an existing crop condition bears to an ultimate harvest. observer can only make an estimate, based on his best knowledge and judgment, and render his report accordingly. If, after careful survey of the situation, he is of opinion that a normal crop is promised, he will report the condition as 100; or, if he thinks that only three-fourths of the crop can be expected, he will report 75. His reports are estimates and, from their very nature, cannot more than approximate the facts; on the other hand, when large numbers of such reports are combined, the resulting figures must closely resemble actual conditions."

So much for the American system of crop reporting, which can justly be characterised as a large-scale, long-established and highly effective scheme whereby the farmers and general public of that country are in a position to benefit by monthly crop bulletins covering crop conditions, prospects, and, at the proper time, soundly-based estimates of yields.

Coming now to Australia, it is to be said that New South Wales is leading the way in an endeavour to establish crop forecasting as an essential and statutory service. Section 27 (1) (a) of the Marketing of Primary Act provides that the State Marketing Bureau shall "publish from time to time forecasts of primary production in each of the States of the Commonwealth of Australia, New Zealand, and such other countries as the Minister may

deem advisable." The reference in the section to other States of the Commonwealth, to New Zealand, and to such other countries is in view of the fact that agricultural products of New South Wales are apt to be closely affected by those of other States and countries. The section contemplates that the State Marketing Bureau shall prepare and issue forecasts of primary production within New South Wales, and that it shall take steps to obtain copies of similar forecasts prepared by competent authorities in other States and countries and to issue same for the information and guidance of New South Wales growers.

New South Wales has a wide range of primary products, and, to cover even a fair number of them by a forecasting service, must needs be a matter of gradual development. Following a good deal of general preliminary work, it was decided that the requisite data should be obtained from three main sources, viz., the field officers of the Department of Agriculture, the farmers themselves, and the Bureau of Statistics. Field officers, in practically all instances, have very extensive districts to cover and their duties entail much travelling. It thus happens that fairly lengthy intervals can occur between their visits to the various centres. This reason alone would have suggested the advisability of supplementing field officers' reports by reports from selected farmers and other persons acting in the capacity of crop correspondents, whose information as to actual conditions within a reasonable distance of their respective homes would be always up to date. An additional reason prompting the appointment of crop correspondents arose from another consideration. It is highly desirable, both as a matter of principle and of expediency, that the farmer should be identified with the supply of information upon which a forecast of his crop is based. The average farmer is, by training and necessity, a keen observer of farming conditions. Every farmer, of course, could not be appointed as a crop correspondent, even if every farmer were able or willing to act, but farmers, as a body, are glad to know that selected farmers, nominated by the field officers, are assisting the State in this all-important matter.

The question arose whether each crop correspondent should be allotted a defined area. On the face of it, something of the kind would appear to be necessary, but careful consideration will show that the defining, by the Department, of areas for crop correspondents is frequently impracticable and rarely, if ever, necessary. If crop correspondents define areas by arrangement among themselves, well and good. Again, if crop correspondents in one portion of the State, having agreed among themselves as to an allocation of areas, desire Departmental recognition of the arrangement, such recognition will readily be forthcoming. It must be remembered, however, that crop correspondents in each industry are resident in and scattered about the districts of the field officers who nominate them, and that it is neither necessary nor expected that every farm in a given industry shall be covered by the reports of the crop correspondents connected with it; by all means include as many farms as possible, but with that the State Marketing Burcau must be and is content. Still another point to be

remembered in this connection is that it is the aim of the Bureau—for a reason that will presently be made clear—to have crop correspondents (one or more according to circumstances) in each Police Patrol in which the particular industry appreciably occurs—and a Police Patrol is frequently a much smaller area than an agricultural field officer's district.

The position of crop correspondent is, of course, purely an honorary one. Necessary forms, envelopes, and official stamps are supplied, but no emolument or allowance for expenses attaches to the position. With reference to this matter, the following memorandum by the writer is designed to afford any requisite information:—

It is not suggested that growers who accept the honorary post of crop correspondent for this Bureau shall incur the expense and loss of time involved in special visits or trips of inspection. What we have in mind is this: Each crop correspondent is undoubtedly in a position to advise regarding the conditions prevailing on his own farm and is probably conversant with those prevailing on adjacent farms. From time to time he may meet one or more of his fellow-growers and avail himself of the opportunity to inquire as to conditions on their farms—the kind of inquiry that is usually made between neighbours and friends engaged in the same industry; furthermore, business will occasionally take a crop correspondent to a local commercial centre and thus afford him the opportunity of observing farms along his route and, it may be, of meeting and discussing conditions with growers whose crops are not ordinarily seen by him. In these and similar ways, but particularly by reason of his unquestionable knowledge of the conditions prevailing on his own farm, it is considered that a crop correspondent can supply the desired reports without special visitations or expenditure.

I have already mentioned that data for the purpose of forecasting crops is to be obtained from three sources. Two of them (field officers and crop correspondents) have been touched upon; there remains the Bureau of Statistics. The field officers and crop correspondents will supply monthly reports as to current crop conditions and prospects. The Bureau of Statistics will be drawn upon for information as to the area under crop and the yields in the previous year. In the case of wheat, the Bureau of Statistics will obtain and summarise police returns in the months of (a) July, as to the area sown, and (b) October, as to the area then under crop. Inasmuch as the territorial unit of the Bureau of Statistics is a Police Patrol, and in order that data collected by the State Marketing Bureau may readily be associated with the figures published by the Government Statistician, it is intended, as previously stated herein, to ascertain the Police Patrols in which the crop correspondents are resident. At this stage, I may be pardoned for interpolating a brief but very sincere expression of appreciation of assistance most readily given at all times by the Bureau of Statistics. I am indebted, also, to the field officers of the Department of Agriculture for their willing and effective co-operation.

Consideration of space precludes my dealing here with such matters as the questionnaire forms we are using. Suffice it to say that, whilst for good and sufficient reasons we are not following the American system in its entirety, the methods adopted conform to the principles of that system and pave the way for its more substantial adoption, with modifications dictated by Australian conditions,

So far the following crops have been covered by the forecasting activities of the State Marketing Bureau, viz., apples and pears, maize, potatoes, citrus fruits, and wheat.

In response to a request by the Honey Marketing Board, steps are about to be taken to ascertain and systematically follow the honey flow of the State and to record particulars of the species of honey-producing trees in bloom in each district.

Forecasts have been issued this year in relation to apples, potatoes, and the citrus yield. With regard to wheat, it was decided that field officers and crop correspondents should be supplied each year with forms, &c., for the following reports, viz.:-

Due Date.	s	hibject
2nd August	Crop conditions.	
2nd September	Crop prospects and e	estimates of yields in bushels
	per acre.	
2nd October	Do	do
2nd November	$\mathbf{Do}$	do

The numbers of appointments to date as crop correspondents are as follow:—Maize, 145; citrus, 61; potatoes, 34; wheat, 360.

Finally, I would point out that this work, required at all times, is doubly needed in a time like the present, when the most efficient marketing of primary products is a vital national necessity. It involves a great deal of detail work in the State Marketing Bureau, but members of the existing staff have been and are being trained to do the work, and it is highly satisfactory to note that while no additional staff expenditure is being incurred, the total expense to be met on account of 600 crop correspondents, who are giving their services free to their fellow-growers and to the State, will be less than £50 per annum—the whole of it for stamps and stationery. I have said previously, and will repeat now, that the position of crop corresspondent is one that should command the respect and commendation of every primary producer.

#### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36a, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once. 4090

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Ardlethan (T. Smith) Quandialia (S. Tomkina) Walbundrie (H. G. Collins) Lecton (W. Rosewarn) Hay (George C. McCracken) Hali (C. R. E. Southwell) Narrandera (J. D. Newth)	 Oct.	1. 1. 1. 1. 2. 4 7, 8.		Bribbaree (J. Aston) Arlah Park (M. Collings) Griffith (W. Snellin) Coctamundra (G. B. Black) Millithorpe (T. P. Smith) Murwillumbah (T. M. Kenned Lismore (H. Pritchard)	Oct.	S. S. 14, 15. 21, 22. 21, 22. 19, 20. 3, 4, 5.
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Wollongong (W. J. Cochrane) Liverpool (B. C. Fitzpatrick) Castle Hill (E. Black) Newcastle (P. Legoe) Granville (B. Hyslop) Maitland (M. A. Brown) Blacktown (A. J. Greenaway)	  Feb.	5, 6, 7. 6, 7. 13, 14. 17 to 21. 20, 21. 25 to 28. 27, 28.	- 11	Braidwood (H. E. Roberts) Penrith (C. H. Fulton) Gresford (A. R. Brown) St. Ives (A. Pickering) Brookvale Kempsey (E. Mitchell) Richmond (R. B. Tate)	js	4, 5, 6, 7. 18, 14. 20, 21. 27, 28. 15, 16, 17. 23, 24, 25.

## The Preparation of Milk for Cheddar Cheese Manufacture and Its Relation to Quality.

A. B. SHELTON, Senior Dairy Instructor.\*

During the last twelve months the belief, popular in cheese-making circles, that it is impossible to apply uniform methods of manufacturing cheddar cheese in both our northern and southern districts has been proved to have no foundation. The main factor in destroying this illusion has been the application of simple methods of preparing milk with one end in view, namely, the elimination of the variations in the biological and chemical compositions of milk, due to the different conditions existing in various districts.

It needs no argument to convince cheese-makers of the essential fact that to make uniformly high-grade cheese they require to be supplied with milk which is clean biologically, enabling them to induce and control a pure lactic fermentation therein, and one which has the characteristic body which can be associated with clean milk having a fat-casein ratio sufficiently narrow to result in a cheese carrying from 50 to 53 per cent, of fat in the water-free substance.

It may be helpful to set down some of the quality standards for cheese milk which are considered necessary, and the means which have to be adopted in order to obtain good results. The biological portion of the problem is only solved by joint action on the part of the milk producer and the cheese-maker, but it is obvious that the most easily applied and economical method of adjusting the fat-casein ratio is the removal of excess butterfat in the form of cream from the blended bulk supply. As to the biological aspect, it can be asserted that it needs no outstanding attempt on the part of the farmer to produce and deliver milk which may be classed as of fair average quality—containing less than 4,000,000 bacteria per c.c., and which would take at least two hours to show colour reaction in a methylene blue reductase test.

#### Milk Grading.

In spite of all that is said about the difficulties of grading fresh milk, it has been proved quite practicable for a capable milk grader to classify milk by means of taste and smell into two grades, viz., fair average quality and second grade. This second-grade milk would take less than two hours to react or decolourise in a reductase test, and may contain anything from 4,000,000 to 20,000,000 bacteria per c.c. The grader, then, can safely be relied upon to eliminate second-grade milk on the platform. The milk should be periodically graded with the reductase test to see that the work is being efficiently carried out, and also to provide a means of educating

<sup>\*</sup> Paper read at the Conference of Dairy Factory Managers and Secretaries, Sydney, 1930.

suppliers by registering any improvement in the biological condition of their milk and recording the same for comparison at least once a week in the form of decolourising times.

Milk classified as fair average quality may be considered as reasonably free from bio-chemical changes which affect flavour development and endanger the stability of the casein during subsequent treatment and manufacture. Pasteurisation of such milk is still, however, a necessary adjunct, because of (a) the necessity of preventing the bacteria therein from competing against and dominating the lactic organisms introduced per medium of the starter, and (b) the economic advantages of obtaining complete control over fermentation throughout manufacture, and the increased yield attributable to pasteurisation.

#### The Disposal of Second-grade Milk.

It remains then to decide on a policy regarding the most satisfactory way of disposing of second-grade milk which has been classified as having developed bio-chemical changes inhibitive to good cheese-making. milk is not wanted by the cheese-maker because second-grade cheese is always a drug on the market, but it must be remembered that it would also constitute a serious monetary loss to the industry to return the rejected milk wholesale to the farmer. One outlet is available for it, made possible by its value as a source of butter-fat, which can be turned to advantage as commercial butter of quality value from first to second grade. Modern roads and transit facilities make it possible to deliver the cream recoverable from this milk to butter factories already established in practically all our cheese districts. This means of disposal works in advantageously when the quantities of cream are augmented by recovery of whey cream from whey and when standardisation of fat percentages in milk is practised, as the combined return from the three sources will make it worth while to arrange transport to, and the handling of cream by the butter factories, even in our southern districts. In the northern areas several companies have dual factories, and are at present making use of the three sources of increased returns mentioned.

#### To Adjust the Fat-casein Ratio.

The adjustment of fat-casein ratios in cheese milk has already been referred to as a necessary feature of milk preparation. To produce cheese of the desired fat content of 50 to 53 per cent. in the water-free substance, it is necessary to have milk containing fat and casein in a ratio of 1 of fat to approximately .7 of casein. While in a few individual cases the ratio may be found to be as narrow as 1 to .72 with such breeds as Friesians and Ayrshires, the predominance of Jerseys in many districts may be responsible for a ratio much wider, and varying all the way from 1 to .56 to the higher figure mentioned above. Again, feeding and seasonal conditions often become contributory factors in widening the ratio, and to these cases are attributable largely the repeated appearance of weak body and greasy

texture in New South Wales cheese. Taking butter-fat as the most commercially valuable constituent of milk, and estimating cheese yields from milk on a fat basis, it is a simple matter to demonstrate that standardisation, or adjustment of fat contents, can be a means of increasing the returne from wide ratio milk as much as 2d. per lb. butter-fat, and at the same time assisting in improving cheese quality.

It is as a means of improving and standardising quality that we are most interested in the adjustment of ratios at present. Standardisation of the fat-casein ratio in cheese milk, when practised in combination with milk grading, pasteurisation, and uniform manufacturing technique, automatically standardises the ratio of proteins to moisture in the resulting cheese. This is readily understood when we make the following analyses. If we start with 100 lb. of milk containing 4.2 lb. fat and 2.4 lb. casein, thus giving a fat casein ratio of 1 to .57, we may easily lose in manufacture approximately 7 per cent. of the fat and 4 per cent. of the casein, amounting to nearly .3 lb. of fat and .1lb. of casein respectively, and obviously the resulting cheese contains only 3.9 lb. of fat and 2.3 lb. of casein. reason of added salt and mineral salts from a fermentation source, the 2.3 lb. casein is increased by about 22 per cent., and jointly forms the solids-not-fat, making them 3.9 lb. fat, 2.8 lb. of solids-not-fat, which incorporated with water to the extent of 37 per cent. gives a cheese containing 3.9 lb. fat, 2.8 lb. solids-not-fat, and 4 lb. of moisture. It will be noticed that the ratio of solids-not-fat to moisture in this mixture is 1 to 1.4.

Similarly, if we use a normal cheese milk, or adjust the above milk to a fat-casein ratio of 1 to .7 by removing .8 lb. of fat, the cheese manufactured therefrom would contain approximately 3.2 lb. of fat, 2.8 lb. solids-not-fat, 3.5 lb. of moisture, and the ratio of solids-not-fat to moisture would be 1 to 1.25. This amount of adjustment in the solids-not-fat to water ratio means the difference between weak body and firm body, and if brought about by modifications in manufacturing methods other than standardisation of the fat content, the higher fat percentage which results brings greasy texture and other defects in its train.

Simple methods of fat adjustment in practice are as follows:-

- 1. Test bulk milk periodically for fat and also for casein by means of the Walker casein test.
- 2. Divide the casein percentage by the fat-casein ratio figure to determine the fat percentage to which it is necessary to standardise.
  - 3. Subtract from the original fat percentage the percentage arrived at in No. 2, in order to determine the percentage of reduction.
    - 4. Calculate the total fat to be extracted and convert to cream figures.

There are several ways of arranging separator, fluming, &c., to simplify the practical application of the work in conjunction with other operations within the limited time available. The testing and checking necessary, even to remitying the results in the cheese, can easily be learnt by the ordinary operator. The casein test referred to is a satisfactory approximate method of estimating casein in sound milk. The equipment necessary consists of an acidometer outfit with the addition of a 2 c.c. pipette and a small quantity of neutral formalin. The test gives what is termed the aldehyde figure, which is multiplied by a factor to arrive at an approximate estimation of percentage of casein present.

Fat-casein ratio adjustment is a technically and economically sound proposition, and is beginning to play a leading part in quality improvement in cheese as well as in bringing about increased returns to the dairy-farmer supplying cheese milk. It has already been put into practice in at least two New South Wales factories on the recommendation of the Dairy Branch of the Department of Agriculture.

#### Pasteurisation is an Essential.

Following the application of the foregoing programme of milk preparation, pasteurisation is, as already stated, a necessary feature in order to eliminate biological developments which are likely to dominate or compete against the subsequently induced lactic fermentation. The Flash system of heating to 160-163 deg. Fahr. is practised in about twelve New South Wales factories, but the efficiency of the process is frequently offset by reinfection with coli and pseudo-lactic bacteria during cooling and delivery to the cheese vat. Every care should be taken to prevent such after-contamination either from pipes, pumps, coolers, fluming, or vats. To sterilise regularly such equipment after cleansing and before further use, efficient means of applying boiling water are necessary, otherwise there is a great danger of milk being recontaminated, and finally having a biological condition which virtually renders pasteurisation wasted energy. Care should be exercised also to prevent a maximum temperature of 165 deg. Fahr. being exceeded, or there is a definite tendency to affect the solubility of mineral salts which bring about coagulation, and to destroy certain active principles which play a big part in subsequent maturation of the cheese.

#### The Influence of the Starter.

The final step of inoculating the milk with the desired type of lactic organisms by means of starter prepared on the previous day commences the actual process of cheese-making, and the power adequately to control acidity development, moisture expulsion, texture development, and maturation depends largely on the manner in which the biological and chemical condition of the milk has been controlled or adjusted, together with the type of lactic acid produced by the starter organisms. The introduction of faulty or contaminated starter does as much harm as faulty milk, by being responsible not only for "off" flavours, but also for detrimental forms of acid; which, when they combine with casein constituents, cause abnormal curd, which becomes sticky, pasty, and short in texture and does not mature normally.

A large number of New South Wales factories are now using improved equipment and methods of starter preparation evolved recently by the Department of Agriculture, and also the improved cultures of lactic organisms which have given notable results in texture development.

# The Economic Aspect.

The various steps in milk preparation outlined in this paper arc, under our modern factory conditions, so interrelated that each plays its part in making the subsequent process of manufacture efficient and reliable. Although it may not be necessary to adjust the fat-casein ratio of milk all the year round in some districts, it is still an important part of the programme to check the fat and casein contents periodically, in order to be prepared for changes caused by seasonal variation in conditions of milk production. It is worthy of note that in one South Coast area where little trouble is experienced with weak-bodied milk, except in the winter season, when the cattle are in the latter stages of lactation, serious consideration is being given to the question of regularly adjusting fat contents in order to maintain cheese quality and monetary returns to the farmer at the highest possible level.

# INFECTIOUS DISEASES REPORTED IN AUGUST.

THE following outbreaks of the more important infectious diseases were reported during the month of August, 1930:—

Anthrax	***	•••	•••	***				Nil.
Blackleg		•••	•••	••	•••	•••	•••	8
Piroplasmo			•••		Nil.			
Pleuro-pne	umoni	a conta	giosa	•••		•••	•••	7
Swine feve	r	•••	••	•••	***	***		Nil.
Contagious	neur	nonia						2

-Max Henry, Chief Veterinary Surgeon.

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# Toxicity of Sodium Chlorate.

H. R. SEDDON, D.V.Sc., and T. T. McGRATH, M.R.C.V.S., Veterinary Research Station, Glenfield.

In view of the fact that sodium chlorate has lately been recommended extensively as a weed poison it was considered desirable to obtain information as to its toxicity for stock.

It has been noted in America that certain cattle seem to have a particular liking for sodium chlorate and greedily consume forage or lick the soil upon which the salt has been sprayed. Areas of vegetation have been sprayed, however, and both sheep and cattle turned upon them without ill-effects occurring. From this it can be assumed that sodium chlorate, on account of its salty taste, is attractive to certain animals, and it would seem possible, therefore, that some animals might lick or consume vegetation solely with a view to satisfying this craving and so gather more of the substance than would be the case if they were merely grazing normally upon sprayed vegetation.

To obtain further information as to the palatability of sodium chlorate an experiment was recently undertaken at Glenfield Veterinary Research Station, wherein sodium chlorate was incorporated with bonemeal as a lick. A full-grown steer was penned and for the first fortnight was offered an ordinary salt and bonemeal lick. This it took readily, the lick being the usual one given to stock at this station. At the end of this time a lick composed of sodium chlorate (two parts) and bonemeal (one part) was substituted. The animal partook of this lick regularly, about an ounce being eaten each day. At the end of a fortnight the steer became ill and developed a severe type of jaundice, due to the poisonous action of sodium chlorate. The symptoms became so intense that it was obvious the animal would not recover, and it was therefore destroyed.

Some tests were also undertaken with sheep in order to determine the toxic dose for this type of animal, and it was found that a single dose of 2 to 3 oz. was followed by fatal effects, death in this case occurring within twenty-four hours. The steer mentioned above received in all 9½ oz. of sodium chlorate (being at the rate of about 3 oz. per day), but the illness in its case was much more prolonged.

The above experiments show that sodium chlorate in sufficient amounts is undoubtedly poisonous to stock, and, further, that it is by no means distasteful and may readily be taken by cattle in a lick, or perhaps the spray licked direct from recently sprayed vegetation.

Sodium chlorate is generally used as a 10 per cent. solution, and as it is usually sprayed only lightly over vegetation it would seem unlikely that sheep or cattle would eat sufficient of the sprayed vegetation to do harm. If they took to licking the recently-sprayed vegetation, however, possibly

they would gather sufficient to cause symptoms of illness, if not death. It seems to us that the greatest danger is from leaving bags of sodium chlorate about where it may be licked by stock, from the accidental use of sodium chlorate in stock licks, or from stock drinking unused spray which has been left in places accessible to them. The liking of animals for this compound will doubtless vary in much the same manner as is the case with common salt.

As for sprayed areas of weeds, it would seem that, where practicable, stock should be removed from them. If this is not done, watch should be kept to see that animals do not go about seeking out and consuming the sprayed vegetation. Particular care should be taken to see that no large quantity of unused spray is so placed that stock may get at it.

# THE MITE, Halotydaeus (Penthaleus) destructor, Attacking Wheat.

Mr. W. B. Gurney, Entomologist of the Department of Agriculture, reports that, following advice received in June this year through the Field Branch to the effect that grubs and mites were attacking and destroying wheat in the Corowa district, he wrote for specimens. Among those received was a mite which forms a new pest record for this State, as it proved to be identical with the description and figures given by Tucker of *Penthaleus destructor* in South Africa, and agreed with specimens of this species obtained from Western Australia. In addition to the specimens forwarded from the Corowa district, others were received about the same time from Henty.

On visiting Corowa, Mr. Gurney found this species, together with a few Notophallus bicolor, present, but the major pest was P. destructor, being also apparently prevalent on weeds and Subterranean clover. It is therefore desired to place on record for the first time the occurrence, in New South Wales, of this pest, which, although perhaps only occasionally damaging young wheat, may appear more often in Subterranean clover, peas, and other crops. Although possibly present for some time in Murray River districts, Mr. Gurney points out that the mite does not seem hitherto to have caused any serious damage. Laboratory and field experiments in the use of control dusts and sprays have been carried out and are being continued.

Incidently, with regard to the name of this species word has been received through the courtesy of Dr. Tillyard that Mr. Womersley, who has studied P. destructor in South Africa, considers P. destructor should now be called Halotydaeus destructor.

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# Coccidiosis in Fowls.

J. K. HUTCHISON, B.V.Sc., Veterinary Research Officer, Veterinary Research Station, Glenfield.

COCCIDIOSIS in fowls is a highly infectious and fatal disease, especially in chickens of from four to ten weeks of age, and is due to small parasites called coccidia, which are visible only under the microscope. The disease is seen in both young and old birds, and is most serious among chickens after they have passed the brooder stage, although chicks in the brooders may be affected.

Among chickens the disease runs a rapid course, and, where they are closely confined or poorly cared for, the mortality may be as high as 100 per cent. of birds affected. In any case, chickens which recover are stunted in growth, and, as a rule, prove unprofitable as layers.

In older fowls the disease is much less severe, and grown birds may harbour coccidia without showing ill-effects. They may, therefore, act as carriers of the infecting coccidia and so spread the disease. Losses, however, may occur in adult fowls, but the progress of the disease is slow and birds die only after wasting away for some time.

#### The Cause.

The causal organisms, known as coccidia, invade the cells lining certain parts of the digestive tract. These coccidia multiply quickly and prolifically, and pass from cell to cell, bringing about considerable destruction of the lining membrane of the bowel. As a result, the normal digestive processes are interfered with so that proper assimilation of food does not take place and the birds lose condition. Further, the damaged tissues act as a poison or toxin to the system, and micro-organisms from the bowel are able to find their way through the breaks in the lining membrane, and getting into the blood stream, set up secondary effects.

# Spread of the Disease.

The coccidia have a very complex life-history. After one form of multiplication, newly-formed parasites pass from cell to cell. From another form of multiplication, bodies are formed for life outside the body, and these are very resistant to external influences. These spore-like bodies pass out in the droppings, and the runs become infected. Healthy chickens contract the disease by taking in the parasite through the medium of food and water. It follows then, that where the birds are closely confined, or when the droppings are allowed to accumulate, there is a greater tendency for heavy infection and serious losses. Where good sanitary conditions are maintained, the spread of the disease never tends to be so great.

## Symptoms.

Chickens.—The symptoms shown by chickens suffering from coccidiosis are not characteristic of coccidiosis alone, as somewhat similar symptoms may be seen in outbreaks of other infectious diseases. Chickens under one month are rarely affected. It is generally when the chickens are removed from the brooders to infected runs that sickness and mortality from coccidiosis occur.

Affected chickens become weak and depressed. They lose their appetite and stand bunched up with ruffled feathers and drooping wings and tail. The droppings become fluid or semi-fluid, and in very severe cases contain blood. In some cases symptoms of weakness in the legs are shown, but it does not follow that all cases of "leg-weakness" are due to coccidiosis. In the ordinary course, the majority of affected birds die in from one to seven days after showing symptoms. Very young chicks may die without showing any apparent sign of disease. The severity of the disease is dependent upon the number of parasites, which, in turn, is dependent upon the amount of droppings which contaminates the food and drinking water. The older and more vigorous chickens do not suffer so severely as chickens which are less thrifty, poorly housed, badly fed, or infested with worms, &c. Any factor which tends to reduce the resistance of the birds to disease will contribute towards serious and disastrous losses from coccidiosis.

Adult Fowls.—In adult fowls it is only rarely that coccidiosis assumes a rapid course. Usually the disease is of the chronic type, that is, affected birds show gradually increasing debility and may be sick over a period of weeks. The comb becomes pale and the bird appears dejected. There is cessation of egg-laying. The appetite may be retained at first, but it finally becomes irregular. Affected fowls may die quite suddenly after a sickness of from two to three weeks, but in other cases birds may linger on for several weeks.

Carriers.—Frequently chickens apparently recover from the disease, but if a microscopic examination is made it is found that these birds are still infested with coccidia; they have attained a tolerance to the disease. However, these "carriers" are constantly passing out the resistant, spore-like bodies in their droppings, and are thus direct means of the spread of coccidiosis. Such birds may remain apparently healthy, being tolerant of the coccidia which they harbour, while others may later go off in condition and die of coccidiosis.

# Post-mortem Appearance.

The principal changes are found in the intestines, especially in one or both cases (this guts) and in the duodenum (first loop of the intestines). The cases are inflamed and distended with a blood-stained semi-solid mass. Their walls are thickened and firm, and on incision show areas of yellow grey necrotic (or dead) tissue of cheese-like consistency. Numerous haemorrhagic patches may be seen in the lining membrane, which is

degenerated. In the duodenum, especially in older birds, the lining membrane is frequently congested, and shows haemorrhagic areas. The lining membrane is destroyed, so that the bowel is filled with a thick, dirty-grey material.

#### Diagnosis.

Certain diagnosis of coccidiosis cannot be made either from the symptoms shown by the affected chickens, or from the naked-eye appearance of diseased tissues, since there may be a similiar appearance in other conditions.

Diagnosis can be made certain only by means of the microscope, which reveals huge numbers of coccidia in the droppings. Generally, however, when there is a serious outbreak of disease among chickens just out of the brooder stage, it is attributable to coccidiosis.

When mortality among young chickens occurs, two or three sick but living birds should be submitted for examination.

When serious losses occur during the brooding period among the baby chicks, the deaths are more likely to be due to bacillary white diarrhea than to coccidiosis.

#### Prevention.

Sanitation is the basis of control of coccidiosis. Since the droppings are the direct means of the spread of the disease, they should be regularly collected and taken to a place inaccessible to fowls. It is most important that chickens should not be overcrowded, badly housed, or improperly fed and cared for. The watering arrangements should be such that chickens cannot have access to moist places where they are particularly liable to pick up the parasites.

As mature fowls are a source of infection, chickens should be brooded and reared on runs where adult fowls have never been kept. This has the further advantage that the ground is spelled between seasons.

#### Treatment.

Unfortunately, coccidiosis has proved a very difficult disease to treat. There is no known drug which, with certainty, will destroy the coccidia in the lower part of the bowel.

In the case of an outbreak of coccidiosis treatment must aim at-

- the removal of all factors which tend to lower the body resistance of the chickens;
- (2) the prevention of further infestation with coccidia;
- (3) the prevention of the spread of the disease to chickens not yet infected.

Chickens, therefore, should be kept in small numbers and should not be overcrowded. All sick chickens should be isolated immediately they show symptoms of sickness. This is most important for the reason that the droppings of affected chickens are heavily charged with the parasite.

It is essential that all droppings should be removed and taken to a place inaccessible to fowls. During an outbreak, houses should be cleaned out daily. Where the nature of the flooring allows, the floor should be thoroughly scrubbed, a reliable disinfectant (such as Jeye's Fluid, Cyllin or Cresol at the rate of three-quarters of a pint to 4 gallons of water) being added to the washing water.

It is advisable to remove the surface soil of the runs to a depth of 2 to 3 inches. If this is not done the ground should be covered with chloride of lime or slaked lime.

In regard to medicinal treatment, it has been found that the feeding of butter-milk, milk powder, or any milk product containing a quantity of milk sugar, renders the bowel contents to a certain extent unfavourable for the growth of coccidia. For this reason butter-milk, skim-milk, or sour milk may be used, either in making up the mash or given to the chickens as a drinking fluid in addition to an ample supply of water. Milk powder (30 to 40 per cent.) may be given in the mash to chickens between the ages of four and eight weeks. Poultry-farmers are advised to make use of the cheapest milk product available, but care should be taken to see that only wholesome (not mouldy) products are fed.

The addition of catechu (10 grains to the gallon) to the drinking water has been found to give good results. The catechu should be finely powdered, stirred up with hot water and added to the drinking water or the mash.

# TESTING DIFFERENT STRAINS OF WELLINGROVE MAIZE.

EIGHT strains of Wellingrove maize were included in the trial carried out at New England Experiment Farm, Glen Innes, last season. All the samples submitted for testing were of good type, although some differences were noticed in the maturity of the strains, those submitted by Messrs. Croskell, Wilson, and Lightfoot Bros., appearing to be the earliest, and that from Mr. Elliott the latest maturing. The autumn conditions were very mild and therefore favoured the later-maturing types, and it will be interesting to see whether these strains maintain their advantage in another season.

The trial was sown in duplicate on 23rd October, 1930, and harvested on 30th May, 1930. The following figures show the average yield per acre from the duplicate sowings:—

						bus.	lb.		
J. T. Elliot, Dangersleigh, Arr	midale					48	42		
R. H. Campbell, Glen Innes		•••	•••	•••	•••	10			
The second The Continues	***	•••	•••		***	48	27		
Experiment Farm Seed (Type	R)	***	•••			45	15		
A. H. Croskell, Wellingrove						43	7	٦.	
Lightfoot Bros. Emmagahad		***	***	***	•••		÷	١,	Equal.
THE THE TWEETER THE THE TANK THE TENTH OF TH	***	***	***	•••	***	43	. 4	j	4
	• • •	***	•••	•••		42	48	٦.	***
Gunn Bros., Glen Innes						42	48	۲	Equal.
Experiment Farm Seed (Type	A	•••	•••	•••	•••	7.0		J	-
metacement, renut poed (TAB)	A)	***	• • •	***		41	29		
			0 0	-		-			

—S. C. Hodgson, Experimentalist.

# Codling Moth Experiments, 1928-29.

SUMMARY OF THE RESULTS OBTAINED AT BATHURST EXPERI-

N. S. NOBLE, B.S.Agr., Assistant Entomologist.\*

This series of experiments bearing on codling moth control was carried out at Bathurst Experiment Farm during the 1928-29 season, and included spraying experiments, embracing tests of spray treatments which had shown promise the previous season, as well as some new spray and dust treatments not previously tested at Bathurst.

Trapping experiments for the capture of the adult moths, the treatment of bandages with larvicidal oils, &c., as well as tests of the ovicidal and larvicidal properties of various chemicals, were carried out. Life-history records were also kept throughout this season, and thus data on this phase of the work are now available for the past three seasons.

Owing to limited space the results of the various experiments are very briefly summarised in the following report, while only those tables of special significance are published.

# **Experimental Conditions.**

- (1) The Setting of Fruit.—The setting of fruit in the general orchard as well as on the trees used in experiments was extremely poor. This following on the very heavy crop of fruit during the previous season, with a correspondigly heavy carry-over of over-wintering codling moth larvae, had a material influence in increasing the codling moth infestation during the present season. Perhaps more serious from the experimental point of view was the enormous variation in the fruit set which occurred in individual trees of the same variety. The average number of fruit per tree on the Jonathan apples the season before last was 1,382, but last season the average was only 161.
- (2) Climatic Conditions.—The season was an abnormally dry one, the rainfall during the growth of the crop from the time of the calyx spray to harvesting amounting to only 484 points, compared with 1,648 points during the previous season. The trees were drought-stricken. Leaf fall was premature, and the fruit, though of variable quality, was, generally speaking, under-sized and drought-stricken. Under the circumstances it was

<sup>\*</sup> It is intended to publish a summary of the 1929-30 season's work in the November Agricultural Gazette.

very difficult to estimate injuries caused to foliage or fruit by the application of various spray mixtures.

The average daily temperatures during the early part of the season were abnormally high. The apples blossomed approximately three weeks earlier than usual, the pupation of spring brood larvae and the emergence of moths were correspondingly earlier, and it was found necessary to apply the calyx spray two weeks earlier than usual. There was not the same earliness in the ripening date of the fruit, so that it was really exposed to codling moth attack several weeks in excess of the normal period.

# Field Experiments.

Jonathans apples were used for these experiments, each plot consisting of ten trees, five in each row. The arrangement of the various plots was fortuitous.

The following list sets out the treatments under test:—

## (A) Spraying Experiments, 1928-29—

- 1. Lead arsenate powder 40 oz. to 50 gals. water-5 applications.
- 2. Lead arsenate powder 20 oz. to 50 gals. water-5 applications.
- 3. Lead arsenate powder 20 oz. plus casein lime 10 oz. to 50 gals. water 5 applications.
- 4. Lead arsenate powder 20 oz. to 50 gals, water—4 cover sprays, no calyx spray.
- 5. Lead arsenate powder 20 oz. to 50 gals. water-4 applications, including calyx spray.
- 6. Lead arsenate powder 20 oz. plus lime-sulphur (28 deg. B.) 1½ gals. plus casein lime 10 oz. to 50 gals. of the mixture—5 applications.
- Lead arsenate powder 20 oz. plus lime-sulphur (28 deg. B.), <sup>2</sup>/<sub>2</sub> gal. plus casein lime 10 oz. to 50 gals. of the mixture—5 applications.
- 8. Lead arsenate 20 oz. powder to 50 gals. water, plus miscible white oil (A) 1 part in 60 parts-5 applications.
- 9. Miscible white oil (A) 1 part in 60 parts of water-5 applications.
- 10. Miscible white oil (B) 1 part in 60 parts of water plus hard soap 1 lb, to 50 gals of mixture—5 applications.
- 11. Colloidal lead arsenate 40 oz. paste to 50 gals. water-5 applications.
- 12. Paris green 16 oz. plus lime 3 lb. to 50 gals. water-5 applications.

# (B) Dusting Experiments-

- 13. Lead arsenate powder and lime dust, 1 part in 10 parts-5 dustings.
- 14. Lead arsenate powder and sulphur dust, 1 part in 10 parts-5 dustings.

# (0) Check (Untreated).

It will be seen that the normal spray programme consisted of five applications, which included a calyx application and four cover applications.

## Results of Spraying and Dusting Experiments.

The results of various spraying and dusting experiments are set out in the following table:—

			_						
Treatment.	No. of	No. of	TAO. OI	No. of	Per- centage	Percentage of Calyx Infestation Based on No. of—		Ratio of Stings	No. of Larvae in
meannent.	Fruit.	fested Fruit,	Calyx Entries	Stings.	In- fested Fruit.	Calyx Entries to total Fruit.	Calyx Entries to total Entries.	to En- trances.	Band- ages.
Lead arsenate, 40 oz	800 2,537	371 1,515	26 84	366 1,466	46·38 59·71	3·25 3·31	5·61 4·71	·79:1 ·82:1	90 336
" 20 oz., and casein lime	2,778	1,570	92	953	56.52	3.31	4.77	-49:1	316
,, 20 oz. (4-cover sprays) ,, 20 oz. (4 sprays, in-	1,323	983	157	710	74.30	11.87	12.80	.58:1	231
cluding calyx spray) Lead arsenate, 20 oz., and lime-	3,782	2,272	127	1,125	60-08	3.36	4.47	40:1	455
sulphur, 14 gal., and casein lime	2,214	674	86	309	30-44	3.88	11-45	.41:1	139
Lead arsenate, 20 oz., and lime- sulphur, ‡ gal., and casein lime Lead arsenate, 20 oz., and miscible	5,848	2,854	324	1,334	48-80	5.54	9.88	·41 - 1	725
white oil, 1 in 60 Miscible white oil (A), 1 in 60 (B), 1 in 60	632 721 941	129 290 286	12 69 99	97 33 28	20.41 40.22 30.39	1.89 9.57 10.52	8·76 2·17 3·27	.71:1 .10:1 .09:1	39 77 70
Colloidal lead arsenate Lead arsenate and lime dust	884 762	567 517	61 32	392 218	64·14 67·85	6.90 4.19	7.88 4.67	·51:1 ·32:1	118 114 29
Paris green and lime Check (untreated)	198 166 538	156 78 480	25 4 177	59 60 56	80·34 46·99 87·59	32·89 2·41 30·40	29.85 4.35 12.69	.30:1 .65:1 .09:1	16 227
		1 1			1 1				

# General Conclusions Based on the Field Experiment Results.

The evidence as to the efficiency of the various treatments is in some cases conflicting when considered on the basis of percentage infestation, the ratio of stings to entrances, or the percentage mortality of the larvae. From the results it appears:—

- (1) That lead arsenate at a concentration of 20 oz. to 50 gallons of water combined with miscible white oil 1 part in 60 parts of water, is efficient in controlling the codling moth infestation.
- (2) That there were 13.33 per cent. less infested fruit on the plot which was sprayed with 40 oz. of lead arsenate in 50 gallons of water than when half this quantity of lead arsenate was used.

There was little difference in the ratio of stings to entrances or in the percentage mortality of the larvae. The plot receiving the double strength of lead arsenate carried less than one-third of the quantity of fruit carried by the plot receiving the normal dosage, so the efficiency of the double strength of lead arsenate is probably greater than the results indicate. Where the quantity of fruit was smaller, however, the spray covering could be applied more perfectly, as fewer fruit would be touching one another.

(3) That the addition of casein lime spreader to the lead arsenate resulted in a slight decrease in the percentage infestation, though the percentage

mortality of the larvae, as well as the ratio of stings to entrances, was lower. The use of the spreader resulted in an even coating of lead arsenate.

- (4) That when lime-sulphur was added to the lead arsenate spray it seemed to be an advantage, possibly acting as an ovicide or as a repellent. There was, however, considerable residue, which might necessitate wiping the fruit.
- (5) That colloidal lead arsenate is no more efficient than lead arsenate at the same strength, the percentage infestation actually being slightly higher.
- (6) That the quantity of fruit present on the trees sprayed with Paris green averaged only 16.6 per tree, a number too small for reliable deductions to be made. It was evident that the percentage infested even in this small quantity of fruit was much lower than the percentage of infested fruit in the plot which received the normal lead spraying, though the lead arsenate was applied at a slightly higher rate.
- (7) That, as regards dusting, although the small quantity of fruit present made it possible to give every piece of fruit a perfect dust covering, the codling moth control obtained by this means was not satisfactory, being considerably lower than that obtained when the same quantity of lead arsenate was applied to the trees in the form of a spray. Constant and severe winds, which occur throughout the season, render the application of the dust most difficult, and, although the dusts were applied at 5 a.m., there appeared to be very little dew present on the trees.
- (8) That some slight blotching of fruit was present on plots receiving the normal lead arsenate dosage and on plots sprayed with colloidal lead arsenate.
- (9) That the miscible white oils (A and B) caused no visible damage to the fruit or foliage, although the trees presented a dirty, oily appearance throughout the season, this being aggravated by the adherence of dust to the foliage and fruit. This was not, however, very pronounced at harvest time.
- (10) That there was a pronounced spray residue present on the fruit sprayed with lime-sulphur and lead arsenate, the residue being slightly more extensive where the double quantity of lime-sulphur had been used.
- (11) That the quality of the fruit in all the plots was very variable. A certain amount of cracking of the fruit surface occurred on all the plots, and much of the fruit was undersized, but it was impossible to attribute this to the use of any particular spray mixture.

# Bandaging.

Records of the percentage of larvae reaching the bandages were kept throughout the season for three series of orchard trees. It was found that in the case of twenty-two Rome Beauty apples, approximately thirty years of age and extensively creviced, only 676, or 33.43 per cent., of a total of 2,025 larvae estimated to have left the fruit were recovered in the bandages, the large numbers of pupal cases in the crown and limbs indicating the extensive numbers of larvae which pupated in these positions. From another batch of sixteen Rome Beauty apples of the same age, which had had the larger crevices blocked at the beginning of the season, 611, or 50.42 per cent., of a total of 1,807 estimated to have left the fruit, were recovered in the bandages. Lastly, from a row of twenty-two Delicious apples, which were not so old and in which the bark was in fairly good condition, 875, or 56.59 per cent. of the total of 1,546 larvae estimated to have left the fruit were recovered. Thus it is clear that the efficiency of the bandage depends directly on the condition of the tree.

A test was carried out to determine what percentage of codling grubs crawled down the limbs on to the bandage as compared with the percentage which crawled up the trunk from the ground.

Two adjacent Rome Beauty apples were selected for the test, and two bandages were placed on each tree, separated by a band of tanglefoot mixture. This prevented larvae which crawled down the tree from passing the upper bandage, and also prevented the larvae which crawled from the ground into the lower bandages from crawling higher and reaching the upper bandage. The number of larvae and pupae in the upper and lower bandages were recorded each week. To summarise the results, it was found that of a total of 126 larvae and pupae captured in the bandages on the two trees, 24, or 19.48 per cent., were caught in the lower bandages, while 102, or 80.52 per cent., were caught in the upper bandages.

As the majority of the larvae crawl down the limbs after leaving the fruit, the prospects of the larvae finding shelter before reaching the bandage are much better than they are for larvae leaving fruit after it has fallen to the ground, so that the picking off of infested fruit from the trees will lead to a considerably increased destruction of larvae.

# Chemical Treatment of the Bandages.

This series of experiments, the idea of which was to treat the bandages with a chemical in order to kill the larvae, and thus obviate the necessity of attending to the bandages during the season, was based on the results obtained by American workers with beta naphthol in oil. As well as beta naphthol, copper carbonate, paradichlorobenzene and boracic acid were tested in combination with an oil, and a series of bandages were also treated with this oil alone. The oil in which the chemicals were incorporated was a proprietary reaper and binder oil. Twenty fluid ounces of oil were required to treat six burlap bandages of normal average length, and 2 oz. of each chemical were used for each lot of six bandages.

Totalling the number of larvae caught in the bandages treated with the various chemicals throughout the season, the following results were obtained:—

Bandage Treatment.	Total larve in bandages (either dead or died later before development).	the handeres	Total alive in the bandages.
Boracic	. 72 . 51 . 49	104 64 41 46 28	 'i  1
Total	. 393	283	2

The above table shows that of the larvae found in the bandages, only two were alive, 283 were dead, and 108 died later without developing. In untreated bandages on other trees the vast majority lived and hatched. However, as it is considered that the oil base in these chemical mixtures might possibly cause damage to the bark of the trees, it will be necessary later to test this point and also try out non-oily mixtures.

# Spray Deposits and Injuries.

After grading there was not sufficient deposit on the fruit to render wiping necessary where normal lead arsenate spray alone, or with oil, or where oil alone was used. An appreciable deposit of dust particles was found on some trees sprayed with oil.

Where double strength lead arsenate or combined lead arsenate and limesulphur was used noticeable deposits of these materials occurred.

Beyond the ill-effects of drought no appreciable damage resulted from the use of white oil sprays in these tests.

# Trapping Experiments.

The traps, which consisted of ordinary cake tins 8 inches in diameter, were painted on the outside and lined on the inside with a thin coat of paraffin to minimise the injurious action of the fruit juices on the tin.

Four trees were used in each test, and four control trees were included.

As four different lures were to be tested, a block of twenty-four Rome Beauty apples were selected in the centre of the main orchard block. These were in two rows (twelve in a row), and the four trees (two in a row) were used as buffers between the control trees and the nearest trees containing traps.

The following lures were tested:-

Vinegar	10 per cent. solution in water.
Fermenting molasses Unfermented apple juice	10 per cent. solution in water.
Oider	25 per cent. solution in water.



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	Trap No. 1.		Trap No. 2,   Trap No. 3.				Trap	No. 4.			
Lure.	No. of Fruit.	No. of Moths.	No. of Fruit.	No. of Moths.	No. of Fruit.	No. of Moths.	No. of Fruit.	No. of Moths.	Males.	Females.	Total.
Cider		203	291	138	172	175	147	165	273	408	681
Molasses ferment Vinegar Unfermented apple	97	112 115	259 270	102 96	271 60	105 59	252 142	111 76	191 153	239 193	430 346
juice	95	68	227	76	43	51	260	43	93	145	238
Total				•••			.,.		710	985	1,695

The total numbers of moths trapped in the various lures during the season are set out below, together with the total fruit on each tree:—

Thus a total of 1,695 moths were captured in sixteen traps during the season. Of this total number 985, or 58.12 per cent., were females and the remaining 710, or 41.80 per cent., were males.

It is evident that the fermented apple juice or cider proved more attractive than any other of the lures used, being almost three times as effective as the unfermented apple juice, and nearly twice as effective as the vinegar solution. Molasses ferment proved to be second in efficiency, being slightly more attractive than the vinegar solution and nearly twice as attractive as the unfermented apple juice. For practical purposes, and on the score of economy, molasses can be recommended.

The numbers of traps and plots were too limited in this test to allow of any deduction being made as to the value of trapping as a method of control, the idea of the test being merely to determine the relative value of the baits for attracting the codling moth.

# Laboratory Tests of Larvicides and Ovicides.

A series of laboratory experiments were carried out to test the value of hellebore as a larvicide. Various strengths were used, and the results have been recorded in a separate report.

Laboratory tests were made to test the value of several proprietary miscible white oils as ovicides. The results of these tests, which were necessarily limited, can be briefly summarised as follows. Even from the limited number of eggs able to be used in the test there was sufficient evidence to indicate that miscible white oils possess some ovicidal value. This was shown by the lower percentage of eggs which hatched on oilsprayed apples as compared with untreated apples. At the same time, however, the reduced number of eggs laid on the sprayed fruit, compared with the number laid on the untreated fruit, would seem to indicate that the oil possibly possesses repellent properties.

## Summary.

The extremely poor and very irregular setting of fruit, combined with high temperatures and drought conditions, resulted in heavy moth infestations, but the limited number of fruit on the trees this season was rather detrimental, and operated against getting the best results.

Field Experiments—Casein lime spreader added to the lead arsenate slightly decreased the infestation, but the ratio of stings to entrances was lower.

The omission of the cally spray led to an increase in the intestation.

A calyx and three cover sprays of lead arsenate were more effective than four cover sprays without the calyx sprays.

The addition of a fourth cover spray after a cally spray reduced the infestation.

Lime-sulphur, when combined with lead arsenate, gave a rather better result than when the same strength of lead arsenate was used alone, but tended to leave an objectionable deposit on the fruit.

Colloidal lead arsenate resulted in a slightly higher infestation than lead arsenate used at the same strength.

Dusting with lead arsenate and lime, and lead ar-enate and sulphur, proved inefficient.

Paris green resulted in a lower infestation than lead arsenate, though there was very little fruit on the trees.

Bordeaux mixture showed promise as a repellant, but caused russetting  $\alpha^i$  the fruit.

Ammoniacal copper carbonate, pyrethrum and hellebore exhibited little or no value in the particular tests carried out.

Miscible white oils combined with lead arsenate resulted in a definite reduction in the infestation as compared with the same strength of lead arsenate used alone. There was a tendency for the oil to collect dust, and late sprayings with oil might necessitate wiping the fruit when harvesting.

Bandaging.—The efficiency of the bandages depended greatly on the condition of the tree. In old trees with crevices only 33.43 per cent. of the larvae estimated to have left the fruit were recovered in the bandages. Roughly blocking the crevices with wax increased the percentage to 50.42 per cent.

The normal burlap bandage was at least as efficient as any of a series of other banding materials tested. An increase in the number of folds did not increase the efficiency.

Chemically Treated Bandages.—A series of bandages treated at the beginning of the season with copper carbonate, boracic acid, beta-naphthol, and paradichlorobenzene, mixed with a reaper and binder oil, and bandages treated with oil alone, gave a satisfactory kill of larvae without further treatment during the season. Larvae in deep crevices beneath the bandages were unaffected. As oil was used in all cases it is possible that the oil was an important toxic agent.

Laboratory Tests.—Limited laboratory tests indicate that several miscible white oils are somewhat toxic to codling moth eggs, and may remain so for several days after the oil has been applied.

Hellebore used alone and also with casein lime spreader had apparently no value as a larvicide.

Miscellaneous Observations.—In experiments 80.52 per cent. of the larvae which reached the bandage did so by crawling down the limbs of the tree.

During the winter clean-up 29.69 per cent. of the larvae were recovered in crevices and beneath loose bark on 292 experiment trees. The percentage recovered in these locations on twenty-four Rome apple trees about thirty years old was 58.97.

The majority of the larvae cocoon between the tree trunk and the bandage. Many cocoons split during bandage removal, and care should be taken that the larvae do not fall to the ground and escape.

Wire hooks proved an effective means of attaching the bandages.

Very few larvae were recorded as pupating in the fruit, and during dry weather a few pupated against the trunk of the tree at or just below the ground level.

The galvanised iron covered pit devised by the Department for the disposal of waste fruit proved most advantageous. Temperatures generated within the pit were not abnormally high, and probably the very wet conditions within the pit, as well as the presence of gases given off by the fermenting fruit, inhibited moth development.

Life-history Observations.—In continuation of the work of previous years, considerable time was given to life-history studies, and detailed tabulations were made, a very brief summary of which is given hereunder.

Two complete broods and a partial third brood again occurred at Bathurst this season. Spring brood moths began emerging on 27th September, nineteen days earlier than the previous season. First brood moths began emerging on 16th December, and second brood moths began emerging on 15th February, the last moth emerging in the insectarium on 15th March.

Female moths deposited on an average—

- (1) 10.77 eggs for the spring brood.
- (2) 34.18 eggs for the first brood.

The average incubation period of the eggs was-

- (1) 8.69 days for the first brood.
- (2) 6.78 days for the second brood.

The average larval feeding period was-

- (1) 23.47 days for the first brood.
- (2) 20.82 days for transforming larvae of the second broad.
- (3) 27.30 days for over-wintering larvae of the second brood.

The average cocooning period was-

- (1) 6.67 days for the first brood.
- (2) 5.31 days for the second brood.

The average pupal period was-

- (1) 26.99 days for the spring brood.
- (2) 12.21 days for the first brood.
- (3) 15.75 days for the second brood.

The average length of life of moths was-

- (1) Spring brood, male, 14.7; female, 15.47 days.
- (2) First brood, male, 12.13 days; female, 15.48 days.

Parasites and Predators.—The larval parasites, Parasierola sp. and Stomatoceras pomonellae, and two unidentified species of parasite were present this season, but they were very limited in number.

The egg parasite, Trichogramma minutum (australicum), was abundant late in the season.

The common mound ant, Iridomyrmex detectus, was sometimes seen attacking larvae on the ground.

# THINNING OF STONE FRUIT CROPS RECOMMENDED.

Reports to hand show that the early stone fruits in the coastal areas have flowered profusely and at present are showing a heavy setting of fruit. Provided that climatic conditions are favourable there is every possibility of a heavy crop being marketed. This fruit will be placed upon a market which will still be heavily supplied with oranges and apples; therefore, high prices cannot be expected, especially as at the present time the purchasing power of the public is greatly reduced. Experience has shown, however, that even in "glut" periods there is a ready sale for high-quality fruit. Growers are advised that a medium crop of high-quality fruit will return a greater monetary value than a heavy crop of small fruit. The cost of harvesting will be less and the selling price higher. Judicious thinning of the fruit, assisted by thorough cultural methods and spraying operations will do much to improve the quality of the fruit.

The stone fruits as a whole are showing indications of normal to heavy crops; growers of the later-maturing varieties should keep a close watch upon their trees, and where necessary thin the fruit early to ensure a satisfactory sizing up of that retained upon the tree. Much damage has been done to the retail trade in the past by growers harvesting their stone fruits too early. Immature fruit which will not ripen has been placed upon the market. Buyers who have purchased such fruit refrain from buying again for some considerable time, with the result the sale of fruit is slow, and the grower suffers. To obtain the top price the fruit must be of high quality and fully matured.

From present indications the supplies of jam fruit required by the factories will not be as great this season as last, owing to large stocks now on hand.—C. G. Savace, Director of Fruit Culture.

# Orchard Notes.

OCTOBER.

C. G. SAVAGE and W. LE GAY BRERETON.

#### Cultivation.

Copious rains have fallen during the winter, but dry spells may occur during the spring, and it is surprising how quickly the soils dry out; hence the necessity to check the loss wherever possible. Weeds are one of the chief channels by which soil moisture is lost, and the destruction of weeds is therefore one of the most important reasons for cultivation during the spring and the growing period of the trees. The term cultivation is used here in its broad sense, not in distinction between the use of the plough, cultivator or hand implement. If the land was ploughed in the autumn and early winter and has remained in such a condition that the spring ploughing could be delayed until, say, September, or is being carried out now, then in all probability further cultivation for a few weeks will be unnecessary. After the spring ploughing, showers will sometimes cause a thin pie-crust on the surface and innumerable tiny weeds will appear. If the soil beneath the pie-crust is loose and the roots of the weeds are only very shallow, the loss of moisture will be only from very near the surface and will do very little if any harm to the deeper-rooted trees, and to disturb the deeper mulch formed by the previous ploughing would be a pity. However, the position needs careful watching and the weed growth should be dealt with before the roots have penetrated deeply.

At this stage a good tine cultivator, either rigid or springtooth, will effectively destroy the small weeds and leave a very fair loose soil mulch, but it should be pointed out that the constant use of tine cultivators will form a sole pan which increases in thickness as their use is continued. The sole pan prevents free entry of summer rains into the soil, and the depth of the loose soil mulch decreases and becomes less efficient. It is for this reason that the plough should be made use of as far as possible to maintain a loose soil mulch. With the advent of light multiple ploughs specially designed for orchard work, this can be done to a greater extent than previously. Though the ordinary disc cultivator has the objection of leaving the surface soil too fine, the one-way disc cultivator has a plough-like action and is useful, especially in light, easily worked soils for carrying out light ploughings during the summer. There is always more or less soil, however, depending on the kind of tree and method of training, that cannot be reached by horse or tractor implements, and this should be cleared of weeds and loosened by means of hand tools.

Refills amongst older trees that are not fully established should be given special attention and a bucket or two of water should be applied if necessary

during dry times. The water should be poured into a furrow opened round the tree, and after it has soaked in the furrow should be filled in with rotting leaves, straw or farmyard manure, or, if such material is not available, with dry soil. Watering in this way will often later start a certain amount of weed growth and this should be dealt with or the trees will not benefit.

#### Surface Drains.

Drains that have been formed to prevent washaways during heavy rains are liable to be disturbed or blocked during the ploughing and general clean-up of the orchard. They should be promptly put in order and cleared of all weed growth, or heavy losses of top soil may occur.

#### Pests and Diseases.

This is a busy period for growers of deciduous fruit, especially apples and pears, with respect to disease and pest control measures.

Black spot of apple and pear.—Several of our apple and pear districts are either immune from or so seldom attacked by this fungus disease that spray precautions are unnecessary. However, in districts or localities liable to the disease it is unwise to omit the initial applications of spray; later applications can be modified according to the weather conditions. Mr. Atkins, Fruit Inspector of Orange, reports that during the latter part of the winter conditions have been favourable to the development of black spot of apple and pear on the western tablelands, and should these conditions continue a severe outbreak of this disease can be expected unless suitable precautionary measures are taken.

Most varieties were ready to receive their spur-burst application in September, and some ready to receive the pink or colour period application, while other varieties will not be ready for this latter application till early this month (October). The third or calyx application of fungicide will also be applicable with but few exceptions by the end of this month.

Codling Moth.—Though some of the early blossoming apples and pears, chiefly in the coastal districts, were ready during the latter part of September for the first or calyx spray of lead arsenate for codling moth, the main varieties will not be ready until this month. Fruit inspectors in some of our apple and pear districts have noted that a number of growers who a few seasons ago were averse to bandaging as a control measure are now ardent advocates of it, and state they would not neglect it on any account. A fact that apple and pear growers should never forget is that it is the carry-over grub from last season that is the cause of all the trouble during the next, and no "stone should be left unturned" during the hibernating season to destroy as many of the carry-over grubs as possible and to prevent any introduction of fresh grubs from outside sources, as in returned or second-hand cases. Such cases should be dipped immediately on receipt, and completely immersed underboiling water for three minutes.

Btack Peach Aphid.—Where this aphid is present on peach, nectarine, or Japanese plum trees it should be thoroughly sprayed at once with tobacco wash or nicotine sulphate (40 per cent.) diluted 1 part to 600 parts of water by volume, to which is added soap at the rate of 1 lb. to every 25 gallons of spray. The trees should be examined after not more than three days, and if any live aphids can be found, the application of spray should be repeated. If the interval between sprays is delayed too long the aphids will breed up as thick, as they were before and the effort is wasted.

Apple leaf Jassid.—This pest is injurious in two ways. Firstly, it causes damage by sucking the sap from the leaves, which prevents their proper functioning, and if the attack is severe heavy defoliation may result. Injury to the foliage of course means partial starvation of the fruit and tree, and the weakening of the tree may not only affect that season's, but also the following season's crop. Secondly, the fruit is directly disfigured by the excreta from the insect. The jassid can be killed in the larvæ stage with tobacco wash or nicotine sulphate (40 per cent.) diluted 1 to 600 of water by volume. In the larvæ stage it is generally found on the back of the leaves. The nicotine sulphate can be added to the lead arsenate spray for codling moth. If the jassid is allowed to reach the winged stage its control is not possible.

Black Spot and Downy Mildew of Vine.—Grape vines liable to black spot should receive an application of Bordeaux mixture (6-4-40) as soon as the shoots burst out, and applications of 6-4-50 Bordeaux mixture later, should weather conditions favour this disease. The applications of Bordeaux mixture for black spot will also serve to protect the vines from downy mildew, but the sprays must be continued till later in the season for downy mildew than for black spot.

# Spraying Trees when in Blossom.

We are often asked whether it does any harm to spray trees when in blossom-It cannot be imagined that the drenching of the blossom, often at high pressure, with any liquid can help the setting, and certainly spraying when trees are in blossom should be avoided if possible. However, it is well to remember that the application of sprays for the control of pests and diseases. is generally the choice of the lesser of two evils. It is probable that most sprays are to some extent injurious to the plant and are only applied to avoid or suppress something that will cause a greater injury, and at times it is better to risk spraying when the tree or vine is in blossom rather than to allow the pest or disease to do far greater injury. For instance, if weather conditions are very favourable for black spot of the grape vine it is often advisable. especially if an application of Bordeaux mixture has not been made just prior to blossoming, to spray during blossoming. Again, if black peach aphis breaks out during blossoming spraying should not be delayed, as the infestation will have increased to enormous proportions if spraying is deferred until blossoming is over.

# Disbudding of Worked-over Trees.

When examining budded or grafted trees care should be taken to leave as much growth as possible coming from the original part of the tree, only those shoots which are obviously or likely to sap the shoots from the bud or grafts being suppressed. All the lighter growths should be left, and the heavier shoots, if not in a position where they interfere with the shoots from buds and grafts, can be checked by pinching back. Some of these shoots are often useful for putting in some extra buds later to hasten the development of the new top, and in any case the extra foliage helps to keep the old stump and root healthy by elaborating the sap and by affording shade from the direct rays of the sun.

# **Budding** of Citrus.

Mr. W. McCutcheon, Fruit Instructor, Curlwaa Irrigation Area, has supplied the following notes:—

October is a very good month for the budding over of off-type citrus trees to a more desirable type. Budding is best done at this season on the strong growths which arose last year as the result of cutting back and in which any failure in autumn budding resulted. Should the buds again fail they may be renewed immediately their failure is noted, the shoot being cut back to within six inches of the bud as soon as it has "taken," the six-inch stub being used to tie the bud development to minimise risk of breaking off. Usually from six to ten buds on as many strong growths are advisable to re-establish the tree as quickly as possible. A publication giving full details of budding is obtainable from the Under Secretary, Department of Agriculture, price 11d., postage included.

# Apricot Thinning.

Toward the end of the month this operation may become necessary on some holdings. The need for it has increased very greatly owing to the low prices realised for low grade fruit and the high cost of drying small fruit, and probably at present where labour has to be employed a yield of 1 ton per acre of 3-and 4-crown fruit will return more profit than 2 tons of 1- and 2-crown fruit. Growers should therefore see to it that their trees are not overloaded.

NURSERYMEN SUPPLIED WITH SELECTED CITRUS BUDS.
THE Co-operative Bud Selection Society, Ltd., supplied the following selected orange buds to nurserymen during the 1930 budding season, trees from which should be available for planting during the 1931 planting season:—

				Buds of	Buds of
M1 4 1	•		Wa	shington Nav	el. Late Valencia.
T. Adamson, Ermington .	• •	***		3,000	3,000
W. Beck, Epping		***	***	1,000	1,000
A. T. Eyles, Rydalmere		•••		3,000	2,000
J. de Freitas, Fairfield	••	***	•••	200	200
R. Hughes, Ermington	••	•	***	1.000	1.000
L. P. Rosen and Son, Carlingfor	rd	***	•••	5,000	1,200
B. E. Varnall, Ourimbah	**	•••		100	100
C.	u.	SAVAG	E, D	rector of	Fruit Culture.

# Poultry Notes.

OCTOBER.

V. H. BRANN, Acting Poultry Expert.

On previous occasions when the poultry industry has suffered from depression, there has usually followed a falling-off in production, and, as a consequence, better prices have been realised in the following season. The 1930 season has probably created a record for the number of chicks raised and also for the number of people engaged in poultry farming, and the present prices ruling for eggs are lower than since 1923; the one consoling feature is that the cost of feeding is lower. The prospective increase in production is no doubt due to the desire of the farmer to raise more and better poultry to increase his earning power, the one solution for the difficult times.

The present low returns to New South Wales producers are caused (1) by a smaller local demand, and (2) by the surplus of other States being placed on the Sydney market and so reducing the local price as almost to nullify the advantages gained by the export of New South Wales eggs. Not until more uniform prices are ruling in every State and the surplus for export is shared equally by all producers throughout the Commonwealth will better prices be assured. The Sydney market is menaced by outside conditions not under its control, and the ultimate result must be to the detriment of producer and consumer alike. Orderly marketing and better handling of eggs will enable greater development of an already important industry and at the same time stimulate consumption by giving the consumer a better quality product at more even prices throughout the whole of the year.

It is believed, however, that the great majority of poultry farmers appreciate the difficulties which confront the New South Wales Egg Marketing Board. Export is absolutely essential to keep prices from falling below even the present low level. The failure of the voluntary pool was brought about by the fact that less than 40 per cent. of the producers were bearing the burden of export. These were acting as benefactors to the industry in exporting the surplus and accepting lower returns in order to stabilise the home market.

#### Chicken Troubles.

The climatic conditions throughout this season have been very favourable for chicken-raising, and results are apparently above the average. However, some of the usual troubles have occurred, and faulty brooding, resulting in chilling, with the consequent diseases in weakened chicks, accounted for the greater percentage of losses.

More troubles are likely to be experienced during the latter part of the season when the weather conditions are more changeable than during the early winter, and it must be remembered that the ground on which the chicks have been run continuously throughout the season is not in the same fresh condition as for the earlier chicks. Then there is the inclination to growd

the brooders as the result of the greater number of eggs being incubated and the better hatching results achieved during the early spring. Everything points to the late chicks not receiving as good conditions as the early ones, and hence it must be expected that heavier losses will be experienced`unless every care is exercised.

With the advent of warm weather all care must be taken to allow extra ventilation to keep a comfortable temperature in the brooder house on warm days, and at the same time to be in readiness for sudden changes that are always experienced at this time of the year.

A common trouble causing considerable losses is that of leg weakness. The chick walks with difficulty and periodically becomes suddenly affected; it appears to suffer great pain and is temporarily prostrated. There is not much loss of appetite, but a complete stoppage of growth. Investigations show the cause of the trouble to be confining the chicks in brooders with an excessive temperature and failing to permit the entrance of sufficient fresh air. Blocking the outlet of the brooders or keeping the chicks confined in a room with inadequate ventilation are common sources of the complaint. It has been repeatedly noticed that when the ventilation is improved, consistent with keeping the necessary temperatures, the trouble rapidly disappears.

Chicken Vices.

Feather-eating, toe-picking and cannibalism among chicks are caused by the craving to make up some deficiency in the feeding. Once a vice is acquired it develops into a habit that is somewhat difficult to control. Lack of grit, common salt, and also the feeding of rations too concentrated or with a nutritive value that is too high are the primary causes. The keeping of chicks under very intensive conditions increases the danger of their developing these depraved habits, and hence the greater necessity to give everything that they require.

An excess of concentrated food must be avoided, and every care taken to ensue that salt is given in the correct quantity, viz., 1 oz. (dissolved in the liquid with which the mash is mixed) to every 5 lb. of mash. Where dry feeding is practised only half this quantity of salt should be allowed, owing to the danger of salt poisoning when placed in the feed in a dry state.

While the want of common salt is the main cause of toe-picking, feather-eating commences more as the result of a desire for roughage—the consequence of feeding rations that are too rich. Affected chickens will consume any other rubbish and fibrous substances available to them, which cause crop troubles as well. The constant picking of the feather stubs occasionally draws blood and may result in the death of the victim if not isolated in a very short time.

Disposal of Breeding Cocks.

The cocks used for breeding purposes during the season just passed will no longer be required until next year. Consideration must, therefore, be given as to whether these birds are worth keeping for another eight months

at an approximate cost of 5s. for feed alone. There is also the probability of a percentage becoming impotent during that time from casual troubles, such as "bumble foot," or from not regaining a condition which will permit them being mated with next year's breeders. It is desirable only to keep the very best birds, or those of any particularly desired strain, for another breeding season.

Cocks should be kept away from the layers with the exception of a few hens which might be left with each bird, as fertility of the eggs during the summer months is often responsible for inferior quality. Incubation of fertile eggs and rapid deterioration of quality will commence after twelve hours at a temperature of 95 deg. Fahr. or more.

# Pullets for Higher Production.

It is generally accepted that the pullets on coming into full production are the most profitable stock on the farm. From ordinarily good breeding stock the percentage of culls from a flock of well-reared pullets that are not worth keeping for layers would not be more than 5 per cent., including weaklings, deformed specimens and very coarse unprofitable types. There is, however, a desire by some persons to go to the arduous task of testing all the stock, with the idea of finding out the "drones." In some cases this practice, after several months of testing, has resulted in the wholesale disposal of many good pullets just on the point of giving better results.

It is quite true that some types are not so profitable as others, and that some are slower coming into production, but the average pullet is more profitable than the average hen one year older or more, even if the hen has given good results the previous year. If it is definitely proved that a large number of pullets are not giving satisfactory results it would be a wiser plan to pay attention to the class of fowl being used as breeders and to the conditions under which the birds are being housed, also to the methods of feeding.

Skilful culling will go a long way to lower the cost of production, but a large number of the hens would have to be disposed of before it would be advisable to start on the pullets—with the exception of the small percentage already mentioned.

Trap-nesting or single-pen testing is commendable work, from which many benefits are derived. It is a means of ascertaining the best layers from among suitable breeders, and of discovering which birds are layers of under-sized or faulty eggs for rejection from the breeding pens, as well as of giving an idea of what the flocks are capable of producing. That pullets are better layers than hens, however, cannot be demonstrated by the fact that they lay many more eggs over a given period, but by their period of production lasting for a greater period of the year. Failure to maintain a large portion of pullets in laying flocks each season will often result in the farm being unprofitable during the autumn months when the older stock fall into moult.

The average yield per hen can be increased by giving the layers careful treatment and disposing of the second-year hens as they "break-up" in the next summer. It is not likely that more than 20 per cent. of hens in their third season will be worth keeping over the moult, and the period that they are not laying would be too long to warrant feeding them during that time.

In most cases it is better to give the first-year hens a rigid culling when they moult, even if it is necessary to keep a few of the older hens that have been particularly good layers and late moulters for another season.

#### The Cause of Crooked Breasts.

The idea that early roosting is the sole cause of crooked breasts is quite unfounded, especially if suitable roosts of 3 inches by 1 inch hardwood are provided and placed not more than 12 inches from the floor for chicks under three months old. The few slight cases that might result from early roosting will be more than compensated for by the better health and development of the chicks as the result of roosting. At any rate, a percentage of crooked breasts is inevitable in all flocks of poultry, and can be put down to other reasons, such as constitutional and inherent weaknesses as well as roosting too early.

Under normal conditions the sooner the chickens are weaned off the heat after they are six weeks old, and induced to roost, the better they will be.

# Soybeans Deserving of More Attention.

The growing of soybeans in New South Wales has so far been restricted to a few experiment farms and a handful of farmers in scattered districts, but the utility of the crop is evident from these tests. The good growth made under a wide range of conditions, the high protein value, the palatability of the forage, and the beneficial effect on soil fertility should result in the rapid extension of the area sown to the crop once farmers have given it a proper trial.

# AN EXPORT TRADE IN FROZEN PORK?

In the course of a report on the preparation and marketing of pig products, the Imperial Economic Committee in London states that the possibility of Australia establishing an overseas trade in mild-cured bacon hinges, to a great extent, on the outcome of researches which are now being conducted with a view to overcoming the difficulty of transport through the tropics. Pending success in this direction, producers in the Commonwealth might well turn their attention to the supply of frozen pork to Great Britain, though it must be admitted that there are certain disadvantages attaching to the trade in the frozen carcase; freight rates are higher than for bacon, and the market for frozen pork is at present limited and seasonal. The possibility of utilising frozen carcases for the manufacture of bacon is, however, well worthy of consideration: it should offer in course of time an outlet for the disposal of the surplus pig products of the Commonwealth.

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Agricultural Gazette of New South Wales.

# Mallee Farming.

[Concluded from page 754.]

E. S. CLAYTON, H.D.A., Senior Experimentalist.

#### The Destruction of Suckers.

One of the best methods of destroying suckers is to put in the first crop without fallowing and then to fallow for the next crop, using the mould-board plough to a depth of 3 inches. Some advise the continuous cropping of the land for the first two years, burning the stubble on each occasion, of course; then for the third crop the land is fallowed with a mouldboard plough. The growth of the second and third crops, without fallowing, may be sparse and the stubble burn disappointing. As these stubble burns are



Sucker Growth on Neglected Mallee Country.

so much depended upon to destroy the suckers, it is advisable, when this system is adopted, to substitute oats for wheat for the second crop, as they furnish the material for a better stubble burn.

Of these two systems the former appears to be preferable, unless cats are grown for the second crop. There is strong evidence that suckering can best be prevented by severing the roots and striking the stumps with some force, as with a mouldboard stump-jump plough, and burning the suckers with as hot a stubble fire as possible. To "scratch in" two or three consecutive crops of wheat without fallowing with the idea of obtaining a

stubble burn each year sometimes defeats its own object. Suckers rob the soil of moisture, and the crops grown without fallowing are poor, and the subsequent burn does not scorch the suckers satisfactorily.

By fallowing the second year with a mouldboard plough many of the surface roots are cut and the stumps jarred, and moisture is conserved so that it is possible to produce a satisfactory crop. The plough has proved so efficient that many successful men fallow portion of their newly-burnt area for the first crop. The system followed is really to cultivate and sow as much as possible of the burnt country without fallowing, and then in the winter to fallow the remainder with a plough.

Even with the best of management suckers are troublesome and require close attention. They must be slashed when necessary. After the second crop is sown they will probably need cutting to prevent loss of moisture and to obviate the possibility of mallee leaves being mixed with the grain during harvesting. Wheat with an admixture of mallee leaves is looked on with disfavour by millers and buyers.

Once country is rolled and burnt it must be cropped and suckers attended to until all the stumps have been killed; only then is it safe to let the land remain out for grazing. Neglected mallee suckers are particularly difficult to deal with. The most economical way is to knock them off with a substantial iron rail or by dragging a suitable log diagonally across them. This will have to be repeated in all probability, working in the opposite direction. A disc plough is also of some assistance in dealing with land overgrown with neglected suckers, provided they are not too large.

#### Cultivation Methods in the Mallee.

In some parts of the Victorian mallee settlers adopted Wimmera methods in an endeavour to increase yields. It was found that on the lighter soils and with a lower rainfall the frequent cultivations found so effective in the Wimmera were not so advantageous. In fact, on some of the mallee such methods, in addition to being expensive, were actually a disadvantage. The use of the harrows in particular was often disadvantageous, as it rendered the soil too fine and encouraged drift.

The heavier mallee soils permit of a great deal of liberty in the matter of cultivation, but the lighter soils should be cultivated with great judgment. Opinions, of course, differ, but it is generally thought advisable to work the soil as shallow as possible (2 inches) and reduce the number of cultivations to a minimum on the light country, allowing the sheep to do as much as possible of the work of cleaning the fallow. The scarifier and springtooth cultivator are considered to be the most suitable implements. Dry working is generally looked upon with disfavour. As long as the fallow is free from weeds and the surface is loose there is no necessity to cultivate it. Every effort is made to consolidate the seed-bed, and once consolidation is achieved it is not disturbed by deep cultivation. On the sandhills an effort is made to compact the sub-surface soil by working the land while it is wet. No definite ruling can be made as to the number of

times the fallow should be cultivated, but it is thought that a fallow worked with judgment and at the right times, even although it may have only received a very small number of cultivations, would give a better yield than one more frequently worked, but with less judgment. It is advisable to fallow 300 or 400 acres or even more, provided it can be cultivated properly. The only way to attend to this large area thoroughly is to keep the implements going at full capacity when the fallow needs attention. It is therefore plain that it is more than a one-man job to work a mallee farm, for some labour has to be available to enable one man to spend all his time with the team.



An Artificial Catchment Area and Concrete Tank.

These are proving useful in very dry areas where the soil is too sandy for ordinary catchment.

Some interesting ideas with regard to cultivation are being tried out in the Victorian mallee. The ridging of the fallow is being tested; it is thought that in country of such low rainfall greater benefit will be derived from light showers when the surface is left in a ridged condition, and the seed sown so that the plants are at the bottom of the depressions, where the water from any light showers that fall will be of greater benefit. This ridging of the fallow is also useful in minimising the drift in dry seasons.

There are many cultural problems restricting production in mallee areas. Up to the present little systematic field research work in this connection has been carried out. Observation and the natural ability of many of the settlers have resulted in the discovery of certain cultural methods which specially suit the mallee soils, but there is a rich and almost untouched field awaiting the agricultural investigator.

## Farming Machinery.

Tine implements and mouldboard ploughs, unlike disc implements, assist in compacting the sub-surface layers, chiefly because they carry much of the weight on the under-surface of the shares and points. Disc implements tend to go too deeply, and consequently cut into the seed-bed to its detriment. A disc implement is only recommended for the first cultivation of a newly-burnt country when the burn has been unsatisfactory and the land carries too much rubbish for other implements to do the work. Proper cultivation is, of course, impossible on new mallee country, but the soil preparation should be carried out as thoroughly as conditions permit.

On new mallee the rigid tine stump-jump scarifier, stump-jump mould-board mallee plough, stump-jump harrows and disc drill should be used. It is not advisable to use a springtooth or rigid tine combine until the land has been cleaned up somewhat. It is a mistake to buy a header on a new mallee block; it is too expensive to operate in rough mallee country. The stripper is preferable for the first few years, as it does the work without heavy losses for depreciation and breakages. The header can be purchased when the farm has been cleaned up. The stripper makes possible the collection of cocky chaff—a great advantage in the first few years when there is no hay available. Strippers are made in 6 feet, 8 feet, and 10 feet sizes. A winnower with motor drive attached will be necessary. One is sufficient for two or three farmers—there is no need for each man to possess one.

A good working plant for a man on a new, large mallee block would be as follows:—A ten-horse team with two spares (twelve in all), or if this is not available a good eight-horse team with two spares; an 8 feet harvester or, better still, a stripper of 8 or 10 feet size; a suitable six or eight furrow stump-jump plough; an eight-leaf stump-jump harrow; fifteen or seventeen tine (rigid) stump-jump scarifier; a large disc drill (afterwards when the land is fairly clean a 20-hoe combine can be used). The 6 feet binder will be preferable until it is intended to cut a good deal of hay, in which case it would be advisable to get a larger machine.

#### Rotation in the Mallee.

Mallee country will not stand up to very constant cropping, and the lighter soils will not withstand too frequent cultivation of the fallow. There has been a tendency in new mallee to overcrop the land and rob it of what little character it originally possessed. This is unfortunate, as it accentuates the natural disabilities of the soil, crops get lighter, and drift increases. It is important, therefore, that mallee settlers in New South Wales take great care not to abuse the land by too frequent cropping in the early stages of development.

It has been extremely difficult to find a suitable and profitable rotation for the Victorian mallee, and the problem is even yet not definitely solved. The two-course rotation of fallow and wheat was soon found unsuitable, as only a handful of sheep could be carried and the land did not stand up

the constant cropping. The three-year rotation of fallow, wheat and oats, was not quite satisfactory, as a shortage of feed occurred in the spring (the oats being kept for hay and grain); insufficient sheep could be carried all the year to utilise economically all the stubble after harvest and before 1st March, when it was necessary to burn in order to prepare the land for cropping. It was also noticed that, although originally quite good stubble crops of oats could be grown on the new country, it became impossible as time passed to grow good crops of either wheat or oats on stubble land, except in very good seasons, and settlers found it almost unprofitable to go to the expense of cultivating the stubble land and sowing it with



Satisfactory Clods on a Mallee Soil.

Such clods can be obtained on the heavier types of mallee soil, but not on the light sandy soils,

oats. A four-year rotation of fallow, wheat, oats, and pasture, was found more suitable and enabled more sheep to be carried, but the areas were too small to permit of its adoption. The four-course rotation of fallow, wheat, fallow, oats was tried, but it was found that the too frequent cropping and fallowing made the soil too fine, and no clods whatever could be obtained on the light soils, with the result that drift increased. Also the grazing afforded was insufficient to carry a suitable number of sheep; when the crops were sown there was nowhere to carry the sheep except on bare fallowed paddocks.

The rotation that is now being tried and which is expected to be satisfactory is fallow, wheat, and then cats sown with a disc drill on the wheat stubble without burning or cultivation, in February, when the soil is dry, at about 1 bushel per acre, with 40 lb. of superphosphate. Sheep are turned

on the wheat stubble and they tramp in the oats, hardly any being caten. In this way dry stubble feed is provided until the oats germinate, and then green feed quickly becomes available for the sheep. This enables more sheep to be carried and considerably reduces drift on light soils, the stubble offering great protection. The only factor likely to upset this rotation is fungous diseases, which may increase because the stubble is not burnt, but these will have to be dealt with as they make their appearance. The oats are only used as a grazing crop (except in good seasons, when they can be cut or stripped), but they are very inexpensively produced by this method.

#### Varieties of Wheat.

On new mallee land tall-growing wheats are preferable. They give a greater bulk of straw, which burns better and is thus more effective in killing mallee shoots. They also have the advantage, when stripping, of allowing the comb of the harvesting machinery to be kept high above ground, where mallee shoots, &c., will be avoided. Short-strawed varieties are particularly objectionable on new mallee country, especially where suckers are troublesome. Late-maturing varieties are not favoured, because there is little soil moisture available on new land, and the crop should be matured as early as possible before hot, dry winds adversely affect the yield.

In the South Australian mallee the following varieties are most favoured on new land:—Ford, Gluyas, Late Gluyas, Currawa, Caliph, Sultan and Felix. Sultan is one of the best varieties in the mallee, and suits both old and new country. It has the tallness, earliness, and hardiness of Gluyas, and it stands up better and yields better on light soil. It is tough to strip, but so also is Gluyas, and a tough variety is necessary for the mallee areas or the wind will shell too much grain from the crop.

Rance yields well and is popular on old mallee, but it is too short for new mallee. Gluyas is good on new mallee on account of its tallness, but unfortunately it is weak in the straw and it goes down easily; it needs harvesting soon after it is ripe because of straw weakness, whereas Rance and Gallipoli will wait for a month or so. Ford is showy in appearance, but often disappointing in actual yield. Currawa is popular; it is good in most respects, but the straw is sometimes inclined to be faulty. Gluyas will not shell out, neither will Gallipoli, but Gluyas lodges badly. Short-strawed varieties are preferable in old mallee on account of the wind.

Rajah and Waratah shell too easily in the wind, and mallee areas are notoriously windy. The later-maturing varieties like Gallipoli are good. In South Australia wheat-breeders have concentrated on producing bright-strawed, narrow-flagged varieties like Gluyas, with a low transpiration rate, which are a trifle tall (to get good stubble burns in new mallee to destroy suckers), while those of Victoria seem to have done the same, except that they have produced varieties with shorter straw. On old cleared mallee land Sultan and Ford are considered good varieties. Where lime is present in the soil to any extent, Early and Late Gluyas are useful sorts. On light

sandy mallee, where lime is not present, Sultan and Gallipoli are favoured, but Gallipoli is short in the straw and therefore is not so suitable in new country where stumps are numerous.

Earliness is an important factor on the outer edges of the wheat belt, where wheat is grown under conditions of low rainfall, high temperatures, and short growing seasons. Some of the most successful early varieties produced in South Australia to suit the peculiar conditions obtaining in the mallee are Gluyas, Caliph, and Sultan. There is, however, a limit to the possibilities of breeding and selecting for earliness. It is possible to produce varieties of still earlier maturity, but apparently the limit of usefulness has been reached as far as this particular quality is concerned. It is probable that varieties that mature too early (i.e., earlier than Gluyas), although they may give a yield of grain even in the driest years, are too far advanced in normal seasons to take advantage of any showers that fall in the spring, and consequently do not give as good an average yield over a period of years as those varieties maturing a little later.

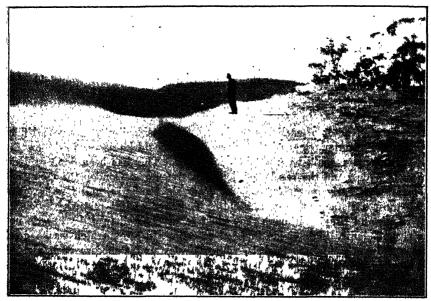
Plant breeders, in co-operation with agricultural instructors, could develop the factor of earliness to the most profitable limit. By actual field tests on the outer edges of the wheat belt it could be ascertained how far early maturity could be profitably developed. This has been done in New South Wales, and the results of field experiments at Condobolin show that varieties of early maturity, such as Waratah, Canberra, and Gresley, give the most satisfactory average yields. Those of earlier maturity, such as Firbank and Binya, although they yield relatively well in dry years, do not give sufficiently high yields in good seasons. In 1924, which was a good year, Binya yielded 20 bushels, while Gresley and Canberra each yielded 26 bushels. We have every reason to expect further assistance from plantbreeders in the direction of breeding and selecting varieties for disease resistance (especially flag smut), and of varieties which will possess the very special qualities required in our mallee areas, such as toughness-so that when the crop is ripe the grain will not be shattered by the severe winds-and strength of straw.

#### Drift.

Although the soils on the Euabalong-Roto area will not, in all probability, drift as badly as the mallee soils in South Australia, they nevertheless may drift after being under cultivation for some years, and the time to make provision against this is before the land is cultivated.

The natural mallee should be left as windbreaks 2 to 3 chains wide along all the roads separating blocks, especially those running north and south. On those running east and west the windbreaks need not be so wide. If possible the blocks should be subdivided so that the paddocks run north and south; when the blocks are a mile or more wide a windbreak running north and south can be left about every half-mile. Such a provision would greatly minimise the bad effects of wind in later years.

In areas that are likely to drift badly, such as the Northern Murray mallee in South Australia, settlers are extremely careful in their choice of cultural methods. They are faced with the difficult problem of cultivating the land in order to conserve moisture and grow good crops in these regions of light soils and light rainfalls, and at the same time of preventing the surface soil becoming fine and blowing away. Any carcless or ill-conceived cultivation is disastrous, and it is only by the exercise of great judgment, born of experience, that the land can be safely cultivated in dry seasons.



Severe Sand Drift on a Metal Road in South Australia.

Near Pinarco, in South Australia, on the sandhills, the farmers generally cultivate their fallows only three or four times, and then only when the sand is actually wet—not merely moist. It is light, sandy soil, and the farmers work it in the rain with cultivators and harrows. Working while wet gives consolidation to the sub-surface and also puts the area into the nearest approach to a cloddy mulch that is possible on these soils. Harrowing in the rain has proved more effective than working with the springtooth, both for getting consolidation and for stopping drift.

Long summer fallow is not favoured on areas which drift; early winter cultivation is satisfactory, but it must be shallow. For the initial ploughing on sandhills 2 inches is sufficiently deep; if the lower layers are stirred it is hard to compact them again. Earliness is essential—fallowing should be finished before the end of July. The ploughing is done dry if necessary, but farmers do not favour this practice.

Sheep are used to keep the fallows clean in summer and compact the soil. To prevent drift, instead of fallowing the land in winter, oats at 10 lb. per acre (sometimes up to 40 lb.) are sown with superphosphates. When possible one cultivation after rain and before sowing is favoured. A light harrowing after seeding seems to compact the soil around the seed, but opinions differ as to the value of this practice. The oats are closely grazed.

Another scheme that is successful is to sow oats on the sandhills and leave it ungrazed until it comes into ear, but before it is ripe. It can be grazed lightly if required from time to time, and is grazed heavily to clean it up about harvest time. Then the land is worked up as fallow. Ample material is present to prevent drift during the summer months and over harvest.



A Mild Sand Drift in Pine and Mallee Country in Victoria.

An endeavour is made to avoid leaving the hills bare during the part of the year when drift is worst. On ordinary mallee soils the springtooth is favoured for leaving clods on the land to prevent drift, but a very strong wind in dry times blows down these small clods. If the land is harrowed when quite wet, however, the soil holds together satisfactorily. The harrows should only be used towards seeding time or after good rains. They cause drift if used on dry fallow in the summer months.

Farmers do not attempt to touch the fallows in the dry weather during summer. Falls of less than 30 points are ignored. If weeds are bad the scarifier is used, if not, the harrows. To harrow at any time other than when the surface is wet would be disastrous.

The worst sandhills should be left out of cultivation. Rye sown on such hills has given good control; it is hardy, and can thrive in spite of loose seed-bed conditions, and it is palatable, but when it comes into head is not eaten, and so re-seeds itself. Evening primrose is also successful; it will not stand up to heavy stocking, but it holds the sand and stops drift, and will carry a few sheep. When the land has been top-dressed for a few years it may grow other feed for pasture, after the evening primrose has arrested the drift. Blue lupin is also very successful in South Australia for preventing drift. Sheep do not eat it except when it is very young. and it is therefore necessary to keep the sheep off from just after germinating till the plants are 4 or 5 inches high. After this stage they can hardly be forced to touch the plant, either green or dry, but they eat the seed, which is of fairly high carrying capacity for a short period. It is possible to fatten three or four sheep to the acre on the seed. Lupins ripen in early summer and the seed can be grazed until early autumn. The pods burst violently, and throw the seeds a distance of 10 yards or more.

#### Sheep on Mallee Farms.

For the first few years on a new mallee block no sheep can be carried, as there is insufficient feed to support them, but an effort should be made to introduce sheep as soon as possible. On most of the older mallee country in Victoria the raising of fat lambs is a very profitable and popular adjunct to the wheat-farming operations. Lambs do exceptionally well on such country, and many men find that they can depend on making £1 a head from their ewes in this way.

Although fat lamb raising is so successfully undertaken by a large number of mallee farmers, the general opinion seems to be that dry sheep are preferable to ewes and lambs on small farms. As a settler's methods improve and as he makes provision for growing oats for his sheep, he may find that instead of having to confine his grazing activities to dry sheep he can successfully undertake the more lucrative venture of fat lamb raising. In my opinion this should be the objective of every mallee farmer, as fat lamb raising under capable management can be very profitable; but it is likely that only the most efficient men will achieve the objective, and the average man would be better suited with dry sheep.

#### Tractors.

Tractors are not favoured to any extent in the Victorian mallec, judging by the small number to be seen in actual operation and by the expressed opinions of the majority of the settlers. In country where stumps will inevitably be encountered for many years, tractors cause many breakages of the machinery. Experienced horses automatically ease up when a stump is struck, and so save the machinery to a great extent. In sandhill country tractors are most unsatisfactory on account of the slipping. Certainly at the present time the small man on mallee country who has only a one-plant outfit has more chance of success if he uses horses instead of a tractor.

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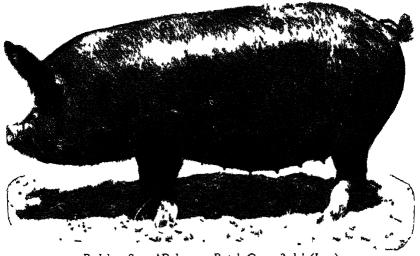
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Tractors undoubtedly do good work under certain conditions and canwork rapidly, which is a great advantage on heavy country where the ploughing season is limited, but the general opinion at the present time-in mallee country in Victoria and also in South Australia seems to be that: horses can do the work at less cost per acre and produce wheat at less cost per bushel than can the tractor. A good eight- or ten-horse team is required, and two additional horses (for emergencies) should be available. Small teams of six horses are inefficient and do not make it possible to employ the man labour to capacity.

#### Fencing.

A division fence that is popular in the mallee district of South Australiar is one of five No. 10 galvanised wires, with the bottom wire 4 inches from the ground and the others spaced 5 inches, 5 inches, 5 inches, 6 inches, and 7 inches, with a barbed wire 8 inches above the last plain wire. The fence is 3 feet 4 inches high, with posts placed half a chain apart and with three wooden droppers between the posts.

Mallee pine, belar, red gum and box are the ant-resisting timbers of the mallee, and should be used for fencing. White ants are generally very-troublesome in mallee areas.

#### Sour-sap of Fruit Trees.

Sour-sap has developed in a pronounced form in some of the fruit-growing districts during the present season.

Fruit Inspector Thornell reports that the disease is taking heavy toll of cherry trees in the Young district. In the coastal areas, peach trees which were in a perfectly healthy condition last season have, during the past few weeks, developed the disease in an alarming way. Many trees have died out and numbers of others have had to be cut back so severely that their balance and appearance have been completely spoilt. In some cases 50 percent. of peach trees are severely affected.

The cause of sour-sap in this State is not definitely known, but it appears to be due to some physiological disturbance within the tree, and possibly has relation to extreme weather conditions, viz., a long spell of dry weather followed by a wet period, or *vice versa*. So far all attempts in this State to isolate a causal organism from affected trees have failed.

Extensive investigation of the disease by the Department of Agriculturehas been carried out over a number of years and is still in progress. Although sour-sap has been found in trees on both well-drained and poorlydrained land, instances have been noted this season where affected trees: appeared to be definitely associated with bad drainage and soils of a very retentive nature. It is certainly advisable where such conditions exist tomake ample provision, in the way of drainage, to carry off excess moisture.

A leaflet on sour-sap is available free of charge on application to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney. W. A. BIRMINGHAM, Assistant Biologist.

#### Melon Trials, 1930.

J. DOUGLASS, H.D.A., H.D.D., Agricultural Instructor.

WATER-MELONS appear to be losing favour to a slight extent on the market, due to the over-production of a wide range of fruit and also to the poor quality of the majority of melons. Rock-melons, on the other hand, are increasing greatly in popularity, mainly owing to the improved quality of the varieties grown and to the longer time that they are on the markets.

Observation plots and trials with both rock- and water-melons were carried out last year in a number of districts, though the actual yields were not tabulated in every instance.



Burrell's Gem Rock-melon.

#### Rock-melons.

This crop is becoming a very important one in many districts. Around the metropolitan area and in the Gosford district a very large area is devoted each year to early rock-melons. Trials have proved that late maturing types and varieties are totally unsuited to coastal conditions, owing to the risk of destruction of the crop by fungous diseases. Under western conditions, which are relatively late, good quality, heavy-yielding varieties that are suitable for long carriage have given the best results. . The number of varieties under trial has been considerably decreased.

New South Wales growers are largely handicapped by the fact that the major portion of the seed is imported and is very unreliable as regards purity of type. Locally-saved seed is usually taken from good quality melons, without any attention being given to the type of plant; yield, purity to type, earliness, and disease-resistance are seldom considered. The chief difficulty lies in the fact that the vines are usually matted together, and many varieties are grown in the same locality, the insects doing the pollination. On the coastal areas seed selection is extremely difficult owing to the small area of each farm, but in western districts the farms are more isolated, and work is being done in that direction.

The rock-melon and cassaba trials carried out during the past year consisted mainly of a series of variety and strain tests in different parts of the State. The yields obtained in the variety trials conducted in co-operation with Messrs. W. T. Sunderland, of Dubbo, and W. Cole, of Wellington, are shown in the following table. Like the majority of mixed market growers and coastal melon growers, Messrs. Sunderland and Cole dispose of the crop in dozen lots, hence this means of tabulating results was used. It must be borne in mind, however, that the melons vary considerably in size.

1		w. 1	W. T. Sunderland, Dubbo.				W. Cole, Wellington.				
Plots 10 acre.		First Picking.	Second Picking.	Third Picking	Total.	First Picking.	Second Picking.	Third Picking.	Fourth Picking.	Total.	
Burrell's Gem		doz.	doz. 35	doz.	do~.	doz.	doz.	doz.	đoz.	doz. 212	
Irondequoit Early Hackensack	***	25	16 22	30 20	71 61	48		4	4	64	
Sydney Market Golden Honey		19	15 13	9 24	43 50		•••		•••	•••	
Hoodoo	•••					72	80	28		180	
Extra Early Knight Santa Claus	•••		•••		•••	8	16	32 24	20 12	104 56	
Golden Beauty	•••		•••		•••	16	24	8		48	

#### Notes on Varieties.

Burrell's Gem.—This is an old variety that has given excellent results over a number of years. It belongs to the Rocky Ford group, being of medium size, very heavily netted, and of highly flavoured flesh, with a strong, pleasing aroma. The chief difference between Burrell's Gem and Rocky Ford lies in the shape, the former being oval, while the latter is spherical. Rocky Ford has in the past few years been degenerating in New South Wales; the type varies considerably in most cases, running to a very small type, while the yield has been declining. On the other hand, Burrell's Gem has been a consistently heavy cropper, while retaining a regular medium-sized fruit. This variety produced the best yield in both trials.

Extra Early Knight is a medium to small melon, also of the Rocky Ford group; the quality is excellent. A heavy yielder and worthy of further trial.

Irondequoit is a fairly heavy cropper of the medium to large group. The immature melon is grey in colour and practically devoid of netting. The quality varies considerably, but is usually poor, with a "flat" flavour. This variety has done well in the heavy, poorer types of soil on the coast, and particularly in the Penrith and Liverpool districts.

Sydney Market.—'This variety is a selection from a crossbred grown by the best Sydney market gardeners. The individual melons are not fixed in type, but closely resemble the well-known Early Hackensack variety. It is a slightly flattened spherical type, slightly ribbed, and well covered with a fine netting. The flesh is deep, of deep orange colour, and with a good flavour. Sydney Market is perhaps the most persistent cropper under cultivation at present. The vine is a rank grower and able to stand up to wet weather better than most varieties.



Grey Monarch Water-melons Grown by Mr. A. C. McKimm. Bolwarra.

Santa Claus.—A very robust grower that sets fruit early. ()ne of the cassaba type that is worthy of further trial. The flesh when ripe is pule green in colour and of good flavour.

Banana and Persian.—Two other melons that were not included in these trials, but which are worthy of further trial, are Banana and Persian. The former is a very heavy-cropping variety that produces long, unnetted, well-ribbed fruit of poor flavour and quality. The latter variety has given excellent results in previous years in western districts.

#### Observations on Water-melons.

The Sydney market still demands a long, light-skinned water-melon of fair quality. This type is also in demand to some extent on the northern markets. Melons cross-pollinate and degenerate very rapidly; varieties such as Tom Watson, Ice Cream, Kleckley's Sweet, and others have all been in favour at one time or other, but have gradually declined in quality, yield, and varietal characteristics, until it has become necessary to seek new types. The grey or light-skinned melons that have been giving the most satisfaction on the coast for the past seasons are Irish Grey, Grey Monarch, and Sugar Stick.



Angelo Water-melons Grown by Mr. C. J. Roweliff, Dubbo.

A demonstration plot grown by Mr. A. McKimm at Bolwarra during the past year was of great interest to the district. The variety sown was Grey Monarch—a recommended variety. The cultivation was all that could be expected, and one half of the plot was fertilised with basic superphosphate at 4 cwt. per acre, while the remainder was not fertilised. The basic superphosphate showed increased growth in the top growth in the first few weeks, and produced melons as early as three weeks before the unmanured plot, and Mr. McKimm estimated that the basic superphosphate plot for the season produced about 100 per cent. more melons than the other plot. Grey Monarch, being a popular market type, sold readily, and demonstrated the value of the use of a correct variety and fertiliser in the production of a profitable melon crop.

#### Some Water-melon Varieties.

Kleckley's Sweet is a variety of melon that has been grown in New South Wales for a greater number of years than any other popular variety. It is a long green melon, and has been finding favour in isolated localities. Improved Market Wonder is a similar but more recent introduction, and

has been doing well under local conditions.

Florida Favourite is a well-known and popular variety in all districts.

Angelo.—Home growers or commercial men catering for a local market in the western districts should all try Angelo water-melon—the best high-quality type yet introduced. Mr. C. J. Rowecliff, of Dubbo, has been growing Angelo for the local market for a number of years. By rigid selection the variety is now pure, and is an improvement on the original type. Unfortunately this melon is only suitable for local use, being a rather poor carrier. It is a round, dark-skinned melon, with a very thin rind. The flesh is very solid, deep red in colour, extremely rich in flavour, and the seeds are brownish black. Angelo is a very heavy yielder.

HAWKESBURY DISTRICT SEED MAIZE CONTEST, 1929-30. ELEVEN entries were received for the third seed maize contest conducted by the Hawkesbury District Agricultural Association. Plantings were made on two farms, those of Mr. J. Greentree, Freeman's Reach, and Messrs. Charley Bros., Clarendon, the sites in each case being typical of the best Hawkesbury River alluvial maize-growing soils. Planting took place on the 7th and 8th November, 1929, and the crops were harvested in the latter part of July, 1930. The results are as follows:—

Competitor.	Variety.	On J. 6 tree far:	'S	On Charley Bros. farm.		Average.		
C. Gow Department of Agriculture H. R. Greentree C. Devlin C. Gow Navua Stud W. Salter W. Buttsworth Department of Agriculture J. Greentree W. D. Turnbull	Yellow Hogan Ulmarra Whitecap Large Red Hogan Fitzroy Manning Silvermine Manning Pride Yellow Hogan Fitzroy Fitzroy Yellow Hogan Yellow Hogan Yellow Hogan Yellow Hogan	***	bus. 80 60 69 62 44 61 57 61 53 58	1b. 52 0 0 16 16 8 4 8 32	bus. 70 91 71 73 91 74 76 71 63 48	1b. 53 10 8 44 5 13 30 54 9 12 18	bus. 75 75 76 68 67 66 66 62 60	1b. 52 33 4 3 381 47 29 31 50 39

Mr. C. Gow, the winner, is a particularly successful competitor in these contests. His entry showed considerable care in seed selection and was the best yielding type of Yellow Hogan, all the other types entered showing a deeper, larger and rougher dented grain. The results of the three contests held to date are most interesting, and where varieties have been entered in all three, the average yields have been remarkably even, indicating that the varieties recommended (Large Red Hogan, Yellow Hogan, Leaming, Manning Silvermine and Fitzroy) will maintain their position over a period of years.—L. S. Harrison, Special Agricultural Instructor.

#### Sorghum Trials on the Far South Coast.

JOHN L. GREEN, H.D.A., Agricultural Instructor.

MESSRS E. S. BLACKA, Mimosa Bank, Cobargo; T. J. Kelly, Glengarry, Tanja; G. H. Black, Belcroft, Bemboka, and E. Koellner, Heathville, Bega, co-operated with the Department in carrying out sorghum variety and manurial trials last season.

#### The Season.

The spring and early summer were very nearly ideal, but as the result of a very dry summer most of the sorghum areas in this district failed, yields of over 5 tons per acre being the exception rather than the rule.

		Cobargo.	Tanja.	Bemboka.	Bega.
September October November December	,	Points. 85 220 515 189	Points. 70 193 467 108	Points. 119 266 583 99	Points. 65 251 610 158
1930— January February March April May		48 61 255 43 526	75 167 63 681	37 77 153 19 513	14 91 96 35 697

#### The Variety Trial.

The yields in the variety trials tend to confirm the popularity of Saccaline and White African. In the trials so far conducted no other variety has been able to maintain such a high average yield. If an early variety is sought, although it must be recognised that in using this early variety the yields will be considerably reduced, Sumac cannot be bettered. It is a quick maturer—in the trial at Bega heads appeared nine weeks after sowing, and only four weeks later, on 4th March, much of the seed had been eaten by birds. Both Sumac and White African had their yields considerably reduced by birds eating the seed in the heads. Although in all the trials Saccaline and White African were growing side by side, the birds hardly damaged a head of Saccaline, whereas the White African variety had nearly every head eaten clean.

YIELDS in the Sorghum Variety Trials.

Variety.	Cobargo. (E. S. Blacka).	Tanja. (T. J. Kelly).	Bemboka. (G. H. Black).	Bega. (E. Koellner)
Saccaline White African Cowper Collier Sumac	7 8 6 16 6 0	tons cwt. 9 6 8 0 5 12 8 0 5 4	tons cwt. 5 10 5 10 3 10 5 0 3 5	tons cwt.  14 6  13 16  10 2  12 4  8 6

#### The Manurial Trials.

In the manurial trials at Tanja and Bemboka no results were obtained owing to the poor growth on these plots. At Cobargo the results distinctly favoured the use of superphosphate, the yield being almost doubled by using 2 cwt. superphosphate per acre. In this trial two plots were left unmanured, one of which yielded 3 tons 18 cwt. and the other 3 tons 8 cwt. per acre. In the Bega trial, although the increase due to superphosphate was very slight, the farmer on whose property the trial was conducted would not consider sowing a crop without using some fertiliser, either superphosphate or a proprietary mixture.

YIELDS in the Sorghum Manurial Trials.

Fertiliser.	Cobargo.	Bega.
Superphosphate (2 cwt. per acre) Superphosphate (1 cwt. per acre) M22 Mixture (2 cwt. per acre) Basic superphosphate (2 cwt. per acre) No manure	tons cwt. 7 0 6 16 5 6 5 4 3 18	tons ewt. 12 14 12 0 13 16 12 18 11 16

NOTE.-White African was the variety used in this trial. M 22 fertiliser mixture consists of equal parts of superphosphate and bone dust.

#### STUDENTS DESIROUS OF GAINING FARM AND STATION EXPERIENCE.

A NUMBER of students, who will have completed the Hawkesbury Agricultural College Diploma Course in Agriculture at the end of the year, desire to gain further practical experience on farms and stations. These lads, about 19 to 21 years of age, have obtained a thorough grounding in agriculture during the three-years' course and can be recommended. Should any farmer or pastoralist desire to obtain the services of any of these lads he should communicate with the Principal, Hawkesbury Agricultural College, Richmond.

Also, during the midsummer vacation (11th December, 1930, to 25th January, 1931, inclusive) certain of the College students are anxious to gain practical experience on approved farms. These students are from about 17 to 20 years of age, and the Principal would be pleased to hear from any farmer or grazier who is able to place one or more of these students.

#### A Lucerne Top-dressing Experiment.

On the Murrumbidgee Irrigation Area.

H. J. DARGIN, Agricultural Instructor.

A TOP-DRESSING of lucerne experiment was carried out under irrigation conditions over a period of the two years, 1928 to 1930, on the property of Mr. N. J. Taylor, Farm No. 968, Whitton, Murrumbidgee Irrigation Area. The soil on this farm is a sandy loam, 4 to 6 feet deep, overlaying a red clay and gravel subsoil, and an excellent stand of lucerne has been established on it since 1923. The bays are situated on a gentle slope with well constructed check banks \( \frac{3}{4} \) chain apart, and the irrigation and drainage control are ideal.

The experiment was carried out at the top ends of six bays, the ‡ acre area of each portion of the bays used in the trial being carefully measured and marked out.

#### The 1928-1929 Season's Results.

The whole of the bays were springtooth cultivated both ways early in July, 1928. Forty-two points of rain fell on 15th July, and the superphosphate was applied with a disc drill on 17th July at the following rates:—

The quantity of superphosphate required for each bay was weighed out and applied evenly.

During the first season (1928-1929), which was particularly dry, the, operations were as follow:—

First Cut.—All plots were watered on the 15th September, 1st October. and 30th October, and the first cut was taken off on 6th November. All manured plots reached a height of 2 feet 6 inches to 3 feet, the density being greater with the heavier application. The untreated plots reached a height of 18 inches only, and were not to be compared with the top-dressed plots in any respect.

Second Cut.—The plots were watered on 24th November, and again on 13th December. The various plots reached the following heights and varied in density in proportion to the height:—Untreated plots, 2 feet; 2 cwt. superphosphate per acre, 3 feet; 4 cwt. superphosphate per acre, 3 feet 6 inches; 6 cwt. superphosphate per acre, 3 feet 6 inches to 4 feet. From this stage onwards till the completion of the trials the yields obtained from the bay which had received an application at the rate of 6 cwt. per acre were in no way superior to the bay which had been top-dressed at the rate of 4 cwt. per acre.

Third Cut.—Plots were watered on 27th December and again on 13th January, 1929. They were cut on 21st January, and the various plots reached the following heights, with density in proportion to their height:—Untreated lots, 2 feet; 2 cwt. superphosphate per acre, 2 feet 6 inches; 4 cwt.

superphosphate per acre and 6 cwt. superphosphate per acre plots, 2 feet 6 inches to 3 feet.

Fourth Cut.—Plots were watered on 30th January and again on 17th February. The fourth cut was obtained on the 26th February; the height and density of the plots were practically a repetition of the previous growth on all plots.

Owing to the shortage of sheep feed, due to drought conditions experienced about this time, it was found necessary to graze sheep on this lucerne field, and no further cuts were obtained during the season.

#### The Second Season (1929-1930).

On 14th August, 1929, No. 3 plot was again top-dressed with superphosphate at the rate of 2 cwt. per acre, and the whole of the bays were springtooth cultivated a week later.

Fifth Cut.—The plots were watered on 13th September and again on 5th November. The first cut of the second year was obtained on 23rd November. No. 3 plot, which received the second application of superphosphate, was the heaviest-yielding bay at this period, and proved to be the heaviest yielding part of the field when the two subsequent cuts were weighed.

Sixth Cut.—The plots were watered once only—on 14th December—and cut on 9th January, 1930, though all the plots were ready to cut about ten days earlier; owing to pressure of work Mr. Taylor found it inconvenient to carry out the work.

Seventh Cut.—The plots were watered twice—on 14th January and again on 16th February—and the last cut obtained on 24th February. From the end of February onwards Mr. Taylor was again compelled to use this lucerne field for grazing sheep on account of the severe drought conditions experienced throughout this part of the Riverina.

YIELDS of 4-acre Lucerne Plots.

	Season 1028-25,							Season 1929-30.					
Plot.	Supernhosphate per acre.	1st Cut.	2nd Cut.	3rd Out,	4th Cut.	Total Yield 1928– 29.	Increase over average of check Plots.	Ith (ut.	6th Cut.	7th Cut.	Total \ ield 1929 - 30.	Increase over average of check Plots.	Total Period (1928 30),
1	Untreated (Check).	Ih. 1,240	lb. 1,715	lb. 1,190	lb. 1,148	lb. 5,293	Ib.	11). 911	lh. 918	1b. 851	11). 2,710	lb.	11. 8,000
2	2 cwt. in 1928	1,840	2,500	2,385	2,297	9,022	3,780.5	1,322	1,386	1,30%	4,011	1,412-5	13,033
3	2 cwt. in 1928 and 1929.	1,820	2,700	2,360	2,311	9,191	3,949-5	1,702	1,681	1,687	5,070	2,471.5	11,261
4	4 cwt.in 1928	2,106	3,102	2,540	2,480	10,228	4,986-5	1,434	1,454	1,392	4,280	1,681-5	14,508
5	6 owt. in 1928	2,120	3,278	2,485	2,472	10,855	5,118-5	1,381	1,479	1,322	4,182	1,583-5	11,587
6	Untreated (Check).	1,175	1,645	1,230	1,140	5,190		963	807	717	2,487		7,677
*	· · · · · · · · · · · · · · · · · · ·	1 38 80	<del>-</del>	1	1	ļ	1	1	<u> </u>	!	ı	1 1	

It will be seen that although Plot 4 gave a slightly increased yield over Plot 3, the effect of the 2 cwt. application each year produced a better distribution of growth than the dressing of 4 cwt. in 1928.

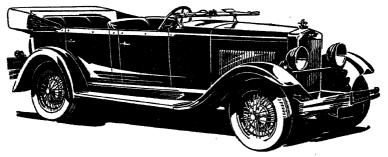
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#### Pasture Top-dressing Trials.

#### On the Upper North Coast.

M. J. E. SQUIRE, H.D.A., Agricultural Instructor.

LARGE area top-dressing trials with a mixture of 2 cwt. superphosphate and ½ cwt. sulphate of ammonia per acre have been under observation on the farms of Messrs. W. J. Rankin (15 acres), R. Thornton, Kyogle (20 acres), W. A. Parbery, Dorrigo (17 acres), and W. Nolan, Tatham, via Casino (14 acres).

#### The Season.

The weather conditions from the time of the application of the fertiliser at Bangalow, Kyogle, and Dorrigo in the early spring of 1928, until the end of that year were extremely dry, but from January to June, 1929, there was an abundance of rain. During the late winter and early spring only medium precipitations were recorded, but there was sufficient moisture in the soil from the previous rains, and the pastures did not suffer any serious check. In December, 1929, there was a dry period, which, though of short duration, was rather severe, as the temperatures at that time of the year are fairly high. In the early part of the present year (1930) the rains were very beneficial to pastures, being received in fairly frequent light showers, though with the approach of autumn they became continuous.

During the dry weather experienced in the latter part of 1928 there was very little growth in the pastures, and the fertiliser on the top-dressed areas remained on the surface for some considerable time as there was not sufficient rain to carry it into the soil. With the bountiful rains in the beginning of 1929, following a dry spell, all pastures made excellent growth, and throughout the district there was a wealth of grass that had not been experienced for many years. During these bountiful times the top-dressed areas, though showing a slight improvement in the colour of the grass and the width of the leaf, were not in any way outstanding. The weather continued fairly favourable to pastures, and the slight improvement in the grass on the top-dressed areas lasted throughout the period. During the autumn of 1929 the clover came away earlier and was much better on the top-dressed areas than on those untreated.

#### Details of the Plots.

Bangalow.—The area top-dressed is somewhat typical of the surrounding country. The soil is a red volcanic loam, and the fertiliser was applied on 6th September, 1928. Slight improvement was observed early in 1929. There was not very much clover on the area, but the small patches which did occur seemed to come away earlier and grow more vigorously.

Kyogle.—This plot is situated on what is known as Fawcett's Plain, which is a very heavy black pug soil. The fertiliser was applied on 24th August, 1928. This area was very slow in responding to the top-dressing. In the autumn of 1929 the clover showed slight improvement, but the grass remained the same. Early in 1930, however, there was a complete change; the grass then began to respond excellently, improving both in colour and rapidity of growth, and the clover thickened up and grew better over the greater part of the paddock. Mr. Thornton stated that the cattle then began to show greater appreciation of the paddock.

Dorrigo.—Mr. Parbery regarded the area top-dressed as the poorest paddock on his farm; the soil is a red volcanic loam. The paddock was top-dressed on 19th September, 1928, and although there was no outstanding response at any given period there has been a gradual improvement throughout; the grass is growing better and the clover content of the pasture has greatly increased. The paddock is now regarded to be equal to the other paddocks on the farm.

Tatham.—The fertiliser was not applied to this area until 10th July, 1929. The soil is a heavy black loam, and though typical of the surrounding country it is generally regarded to be below the average of the paddocks in that part of the district. As the result of more favourable conditions in the early stages of this trial, a much quicker response was obtained than on the other areas, both grass and clover responding well. Portion of the paddock, however, is not naturally well drained, and this portion is not showing the same response as the remainder of the area. In August, 1930, there was a striking difference between the clover on the top-dressed area and on the adjoining untreated area.

#### Summary.

From the foregoing it will be seen that there has been an improvement in the pastures as the result of top-dressing, though, with the exception of the Tatham plot, there has not been the immediate results obtained in some of the earlier experiments conducted on a smaller scale. The fact that the top-dressing has shown more to advantage in the autumn indicates that that period of the year is more suitable than the spring for the application of the fertiliser.

That the stock showed preference for the top-dressed areas is an indication of better pasturage.

#### On Bone-chewing Country at Wolumla.

JOHN L. GREEN, H.D.A., Agricultural Instructor.

This experiment, which was conducted on some notoriously poor, bone-chewing country belonging to Mr. R. Scott, at Wolumla, gave excellent results in favour of the use of superphosphate on that class of country. The sim of the trial was not to ascertain the increased carrying capacity due to use of superphosphate, but the effect on the stock.

All except about 9 acres of the 160-acre paddock selected for the trial was virgin land; a better area it would have been hard to obtain. This paddock was divided into two areas of 80 acres each; each paddock having an equal area with westerly aspect and a small area of flat on the creek that ran through both. The quality of this country is reflected in the value of the land, which is £4 10s. to £5 per acre, and this in the middle of a well-settled dairying district; better quality land in the locality is valued at approximately £20 per acre. The owner has not been able in recent years to raise heifers to the age of two years on the paddock without using lick.

One of the areas was top-dressed with 2 cwt. superphosphate with a broad-caster on 2nd May, 1929. The main grasses noticed when this work was being done were Paddock Love (*Eragrostis leptostachya*) and Kangaroo; a little crowfoot was also to be seen, but the bulk of the growth was of Flat weed, or Cat's Ear, and Dandelion. Clovers and trefoils were entirely absent.

A line of fifty yearling steers was specially purchased for this trial, and divided, as equally as possible, into two lots of twenty-five each. The animals placed on the top-dressed paddock on 22nd May, after a fair fall of rain, were branded for identification.

The following rainfall was recorded during the trial:—May, 94 points: June, 65, July, 42; August, 715; September, 154; October, 236; November, 563; December, 222; January, 48; February, 108; March, 143; April, 433; May, 509; June, 604; and July, 165 points.

Owing to the dry Spring, feed became rather short, and it was found necessary to feed the steers on the untreated paddock during August with sorghum for a period of twenty-five days; the stock on the top-dressed area did not require feeding at all and did not at any stage look as poor as the stock in the other paddock. An inspection made after the 7 inches of rain in August showed the growth on the top-dressed area to be coming away earlier and better than the growth on the other paddock, and a few clover plants were to be seen, whereas in the other paddock clover was entirely absent.

During August the number of head in each paddock was reduced to twenty-one, because of the death of four head in one paddock and three head in the other. From August onwards the difference in the development of the steers on the top-dressed area compared to those on the untreated paddock was most marked.

Early in March an attempt was made to sell the stock in the Bega saleyards, but owing to the depressed market it was not possible to obtain an offer for either lot. Under these circumstances three well-known buyers were asked to place a valuation on both mobs. Two of them valued the steers from the unmanured area at £2 per head, and those from the topdressed paddock at £4 per head; the other buyer valued them at £2 and £3 15s., respectively. This, on a very low market, showed an increase in value of 100 per cent.

It was the consensus of opinion that if the forty-two animals had been placed in the one yard and the best twenty-one picked out, eighteen or nineteen of those steers running on the top-dressed paddock would have been selected. The outstanding difference in the stock was in the size of the animals. It was estimated that there was a difference of 1 cwt. per head in the weights in favour of the steers from the top-dressed paddock.

Mr. Scott considered the stock raised on the top-dressed paddock to be the equal of the stock he raises on another South Wolumla property (referred to earlier as worth £20 per acre), than which there is no better hill-land in the Bega valley.

An examination of the pastures during July, 1930, showed a marked difference between the two. In the top-dressed paddock quite a fair sprinkling of clover was seen, but in the other paddock, even after a diligent search, not one clover plant was found. Other than the clover growth there was a much better sole of grasses and herbage, which gave this paddock the appearance of having a much greater potential carrying capacity than the unmanured area.

#### In the Riverina.

G. C. BARTLETT, H.D.A., Senior Agricultural Instructor.

Experiments carried out at Corowa (on the property of Mr. F. Knight of Bolinda Glen) and at Berrigan (on the property of Mr. C. L. Nicholas, of East Monaro) gave decided increases in carrying capacity for top-dressed areas, even on the very low rainfalls experienced.

#### The Corowa Trial.

An area of 80 acres was treated with 140 lb. superphosphate per acre and 60 acres were left untreated as a check paddock, the fertiliser being applied on 20th April, 1929. Despite one of the driest seasons on record the use of the fertiliser has paid handsomely.

The untreated paddock was regarded as the best feed paddock on the property, having considerably more grass of a better quality, and also more clovers than the 80-acre paddock that was manured. There was an immediate response to the superphosphate, both from clovers and grasses, and the paddock quickly presented a better appearance than the untreated one.

The treated paddock was heavily stocked until it was eaten out bare by the end of April. Although apparently bare the sheep were still finding feed, and were receiving less hand-feeding than the stock in the untreated area. From March till the end of April the sheep on the top-dressed area received 6 oz. per day of grass hay, while those on the untreated area received 3 oz. of Meggitt's nuts and 4 oz. of lucerne hay till the 1st April, and from then till the 30th April, 4 oz. of nuts and 8 oz. of lucerne hay.

With the May rains the top-dressed paddock quickly recovered, and to a much greater extent than the untreated one. Subsequent heavy grazing does not appear to have done it any harm, for when inspected on 6th June, 1930, it was covered with a nice sward of fresh growth of clover, crowfoot and grass. The increase in clover growth was especially noticeable.

The following table gives the number of sheep carried each month and the rainfall:—

				Sheep		
	Montl	1.		Treated Area (80 acres).	Untreated Area (60 acres).	Rainfall.
1929.						points.
May				80	62	23
June				80	62	83
July		•••		80	62	24
August	•••	•••		80	62	150
September				80	62	160
October				470	70	57
November				470	70	24
December 1930.	•••	•••	•••	470	70	158
January				200	70	0
February		•••		200	70	0
March	•••	•••		200	70	43
April	•••	•••		200	70	145

The average number of sheep carried per acre for the whole twelve months on the untreated area was 1.1 and on the top-dressed area was 2.72. Notable features of the trial were the improved condition of the pastures on the treated area, the increased carrying capacity, and the greater amount of hand-feeding necessary on the untreated area. These are all the more remarkable because the period of the trial was one of absolute minimum rainfall—only 867 points for the twelve months.

#### The Trial at Berrigan.

An area of 200 acres was top-dressed with 100 lb. of superphosphate per acre on 7th May, 1929, and the stocking of this paddock and one of 160 acres of untreated pasture was recorded for comparative purposes.

The rainfall for the twelve months from 1st May, 1929, to 30th April, 1930, was only 802 points, and was distributed as follows:—May 56 points, June 82, July 32, August 152, September 86, October 101, November 30, December 146, January nil, February 6, March 24, April 87 points.

The untreated area of 160 acres carried seventy sheep, averaging .43 sheep per acre for the twelve months, while the treated area of 200 acres carried 150 sheep, averaging .75 sheep per acre. This represents an increase of 75 per cent. on just 8 inches of rain. The average annual rainfall for Berrigan district is 18 inches.

The sheep in both paddocks were hand-fed from January, but those in the treated area required considerably less than those in the untreated paddock.

In July, 1930, the treated paddock appeared 200 per cent. better than the untreated, and was in a better condition to respond to rain.

#### TOMATO VARIETIES FOR THE BATHURST DISTRICT.

THE tomato is now one of the most important market garden crops in the Bathurst district, sufficient being produced to supply large quantities to the Sydney market as well as the three local pulping factories.

For the guidance of growers, trials have been arranged at Bathurst Experiment Farm to ascertain the varieties most suited to the different conditions under which tomatoes are grown in the district, namely, under irrigation on both the rich river flats and the poorer upland granite soils, and also under dry farming conditions on this latter type of soil.

Mr. J. A. Williamson, Experimentalist at Bathurst Farm, in the course of his report on last season's trials, supplies the following table of yields and the accompanying comment:—

Variety.	Alluvial I. Irrigate		Upland S Trrigate		Upland Soil Not Irrigated.		
		Yield.	Per cent.	Yield.	Per cent.	Yteld.	Per cent.
Moneymaker Repeater Columbia Marglobe Norduke Norton Stone Matchless		t. cwt. qr. 11 16 3 11 5 0 10 1 2 8 5 2 5 19 3 5 19 3 5 10 0 4 1 3	101 100 89  74  53 48½ 48¾  36	t. cwt. qr. 6 11 2 5 19 2 5 5 3 6 4 2 4 2 13 4 3 2 2 13 2 3 14 3 1 18 01 3 7 3 2 12 3	110 100 88 104 69 70 441 621 313 561 44	t. cwt. qr. 2 19 2 3 2 21 2 16 1 2 18 31 2 19 0 1 19 01 1 17 3 1 12 01 2 1 11 1 16 21	95 100 90 <u>1</u> 93 94 78 62 60 51 65 <del>2</del> 58 <u>1</u>

NOIL -On both upland soil thats superphosphate at the rate of 3 cut, per acre was used, but no fertiliser was used in the case of the other that.

These results emphasise the value of the standard variety Bonny Best as an all-round variety for this district. Bonny Best is a consistent and satisfactory yielder and produces fruit of uniform size and excellent quality and flavour. It is a tomato which is suitable for both the fresh fruit and the sauce trade. Moneymaker, while yielding well, is not a satisfactory variety, as the fruit is small and of inferior quality. Feilen's selected is an early variety under test for the first time and appears promising. Another variety, also in the first year of trial is Columbia, which has given fair yields of good quality fruit. Chalk's Early Jewel and Repeater, while yielding fairly well, were not equal in yield or quality to Bonny Best. Chalk's Early Jewel gives its best yield early in the season, while Repeater yields better late in the season. Of the later-maturing tomatoes, Marglobe and Norduke were generally superior to Norton and Stone. Matchless was very inferior.

The later varieties, such as Marglobe and Norduke, cannot be recommended in preference to mid-season tomatoes like Bonny Best in the Bathurst district, owing to the risk of early frosts, which generally reduce the yields of the latematuring varieties. The limited cropping period in the district prevents the full yields of the late varieties being harvested.

#### Some Nutritional Problems.

An Address Given at the Annual State Conference of THE AGRICULTURAL BUREAU.

C. J. SANDERSON, M.R.C.V.S., Senior Veterinary Surgeon.

In choosing the subject of nutritional problems I was led to do so by a desire to draw particular attention to the vast importance of a knowledge of nutrition in assisting us to preserve health and prevent disease in our animals. With good health and freedom from disease the animal is in the best position to produce meat, milk, wool, &c., and yield a profit to its owner. A proper diet suitable to the requirements of the animal is the greatest factor in keeping an animal in health, and to the old slogan of "Feed for production" we must now add another, "Feed for health." It is only nowadays that we are beginning to recognise that fundamental truth that when the animal is well fed it seldom suffers from disease. By well fed i mean receiving food compounded in the proper proportions for its requirements and fed in adequate amount. Feeding is a science, and, according to such an authority as Sir Arnold Thieler, it is the science of the future.

#### Dietetic Diseases.

Many of the diseased conditions among stock we now know to be due to faulty feeding, and these we class as dietetic diseases. As our knowledge increases we are always discovering more of these, and at the present moment we know dietetic disease to be responsible for more deaths than all other disease conditions put together. The first man who suggested that faulty feeding might be a cause of sterility was laughed at, yet we now know he was correct. Over thirty years ago in New Zealand, Dr. Gilruth demonstrated that good feeding was the best treatment for worms in sheep. He gave concentrates, such as oats, to sheep affected with worms as a supplement to grazing, and found that he got better results by this method than by using drugs. Mr. Max Henry, Chief Veterinary Surgeon of the New South Wales Department of Agriculture, repeated Gilruth's experiment at Glen Innes in 1910, and got the same result. In this experiment the feed fed to the lambs which received no medicine consisted of lucerne, Red clover, Prairie grass, Kentucky Blue grass, Timothy, Perennial Rye grass, Italian Rye grass, and cocksfoot. From April to August the lambs fell off in condition and appearance. Worms were very numerous. following is an outline of the experiment.

Lot 2.—Drenched six times with an arsenic drench.

Lot 3.—Supplied with licks.

Lot 4.—Supplied with licks, and drenched three times.

Lot 5.—No treatment—fed on natural pastures.

In the case of lambs fed on introduced grasses, the average increase in weight during the experiment was 62 lb. Those drenched each month gained 28 lb.; those on licks gained 27½ lb.; those on licks and drenched gained 27 lb. Those receiving no treatment at all gained 21 lb. The whole experiment was conducted from January to September. The lambs were six weeks old at the time of commencement of test. If the weight, increase, and soundness of wool are considered, it will be seen then that worm infestation, even to a considerable extent, is practically harmless, as long as the food supply is abundant and nourishing.

We are fast approaching the time when we shall pay veterinarians to keep stock in health rather than to cure them of disease. When that time arrives the sheet anchor of the veterinarian will be nutrition. It must not be supposed that we have nothing to learn about nutrition, for in many directions we are still groping in the dark, but with some of the best brains in every country devoted to the work of investigation much light has been thrown on many problems.

#### Natural Pastures Generally Deficient.

It is quite impossible, in an address of this sort, to do more than touch on one or two of the many problems of nutrition. Natural pasture is the feed of the vast majority of our flocks and herds, the raw material of the most important animal products we produce, viz., milk, meat, wool and hides, and the source of 60 per cent. of the total exports of Australia. The natural grass is abundant and under ordinary circumstances unfailing, and stockowners regard it as sufficient food for all classes of stock at all times and seasons. This it certainly is not, and one of the reasons why it is not is because we are demanding more from the pastures than formerly, by reason of the fact that the aim of the breeders during the past half century has been to evolve types of animals whose young have a very rapid rate of growth or whose females have a great capacity for producing the constructive materials required for growth. For example, some breeds of pigs will increase from 2 lb. to 2 cwt. in six months, while some cows will secrete in their milk 10 to 12 lb. of solid matter a day. In every class of stock we are quickening our methods. We want baby beef, fat lambs, and types that breed and mature early. Now, we cannot do all this on the natural pastures. Even during favourable seasons the annual loss on account of the poverty of the natural grasses during the winter months must, in the aggregate, be enormous. During much of every winter our herds are losing the flesh accumulated during the summer months, a process that can hardly prove profitable to the stockowners. While we say: "Keep the stock growing during a portion of the year on natural pastures without supplementary feeding," we actually starve them. After the animal once becomes reduced in flesh, let the owner attempt to bring it up again to its condition of greatest usefulness as a milker or as an animal fat enough to kill for beef or mutton and he will have it brought home to him in a practical way how great his loss has been in sparing the feed.

The point I wish to make clear is that during any ordinary or even throughle season, stock running on natural pastures suffer during a big

portion of the year from a protein and a mineral deficiency. They get food enough to live on, but not sufficient for growth or for the production of milk, meat, wool, &c.

I have previously stated that the stock breeder has developed types of quicker developing and more highly producing animals, and it must be understood that the faster the rate of growth and the heavier the production, the greater must be the absolute amount of food required in a given time, and, what is of still more importance, the higher the quality of the feed in those constituents which are requisite for growth of body or production of, say, milk or wool. It is admitted that our pastures have deteriorated, but it is probably not so generally recognised that our improved breeds are making a greater demand on our pastures than ever before. The problem we have to face is that we require more nutritious feed than our average pastures formerly possessed, while actually we have less nutriment in our pastures than was formerly available.

#### How Soils are Depleted of Mineral Matter.

As evidence of the heavy drain on our soils, Professor Richardson has estimated that the soil of Victoria has been depleted to the extent of 360,000 tons of phosphoric acid during the last sixty years through the removal of phosphates in the exported meat, milk and other animal products, and that nearly 2,000,000 tons of superphosphate would need to be added to the pasture lands to restore them to the condition they were in about 1860. Such figures are staggering, and, in order to make you realise how real the problem is, I will mention, for example, that every gallon of milk a cow produces contains the equivalent of 11 oz. of phosphoric acid. Thus, a cow yielding 500 gallons of milk gives out the equivalent of 625 oz. of phosphoric acid, which is the amount contained in 200 lb. weight of superphosphate. These particulars are mentioned to show why there is always. a mineral deficiency at any time in our soils, and that, as already stated, this deficiency is accentuated during the winter months and in drought time by reason of the fact that the plant life does not contain as much of the available proteins and minerals as during the spring and summer or during a normal season.

Protein and mineral matters are the two most important food constituents. Proteins are nitrogenous compounds—the important flesh-forming nutrients. They also form a high percentage of the dry matter in the bodies of cattle, such as skin, hoofs, horns, muscle, &c. Mineral matters enter into the formation of bones, teeth, blood, and other fluids of the body. Protein is the most important constituent, and the proportion of protein in any food is the factor in deciding its feed value. Protein builds up the body of the growing animal; it produces muscle and imparts stamina, besides largely entering into the production of milk and wool. It is now recognised that young growing animals, if they are to thrive and maintain a normal growth rate, require definite and rather large amounts

of protein and minerals, more especially lime and phosphoric acid. Farmers still feed their young pigs on a diet of cereal meals alone, although these feeding stuffs are deficient in protein and lime.

#### Importance of Minerals.

With regard to minerals, Professor Richardson, of the Waite Agricultural Institute, South Australia, says: "It is now found that the mineral content of foodstuffs is at least equal in importance to their energy value." That statement and the following facts illustrate the value of minerals in nutrition.

If mineral salts are completely removed from a diet, the animal receiving it will die sooner than if completely starved. All living cells of the body contain a saline solution which forms 75 to 90 per cent. of their bulk. The growth and functional activity of every organ and tissue, which comprise what we call life, are regulated by the action of the mineral elements in that saline solution. Unless a supply of minerals is fed in sufficient quantity for the animal's needs, the non-mineral portion of the feed given, viz., the proteids, fats, &c., cannot be properly digested.

The bones act as a mineral storehouse, especially for calcium and phosphorus (the two required in largest amounts), storing when the supply is ample and withdrawing when the amount present is deficient. It is probable that this function of the bones, viz., regulating the supply of mineral elements to the body fluids, is as important as forming the bony framework; indeed, it is probably more important, as when the available mineral matter is insufficient to maintain the balance in the blood and the rigidity of the skeleton, it is the skeleton which is sacrificed.

It is a fact which is not disputed that both minerals and protein are deficient in very large areas of the most important pastoral districts of Australia. It is an equally undisputed fact that in most districts the value of the food available to animals undergoes remarkable variations at different seasons of the year. It is during these ups and downs of feeding that disease gets its opportunity. Pasture improvement aims at increasing the quantity and improving the quality of the feed. Grassland management ensures that the feed is eaten by the stock at the period when its protein and nutritive value generally is at its highest. Moreover, by being closely cropped, the grass seeds, burrs and weeds are not allowed to injure the wool. By continuous good feeding break in wool is avoided, and it is here that fodder conservation plays its part. Later, in discussing cystine, I shall show that it may even pay to feed concentrates containing protein.

#### Licks.

Licks will supply the mineral supplement, which is never more necessary than during a drought. While in an ordinary season the minerals in the natural pastures rise to a maximum in the summer and decrease in the autumn and winter, during a drought the supply is low all the time. Further, thuring a drought, with hand-feeding, the concentrates fed are, in

almost all cases, poor in one or more minerals. Minerals are stored up in the bones during periods of plenty and are drawn on when the supply is deficient. The drain in pregnant animals during a prolonged drought is immense. I am firmly of opinion that the excellent results reported from Queensland in the feeding of lambing ewes during the drought was due, in the main, to the very large mineral supplement supplied. This was the opinion of the late Professor Brailsford Robertson, who noted that the ewes had a ration so small that it was hardly a maintenance ration, but nevertheless contrived to mark a very fair percentage of lambs. In the licks it is only necessary to have bone meal or Nauru phosphate and salt, as this will supply the deficiency of lime and phosphoric acid which is about all that is necessary. The practice of including such expensive drugs as iodine can only be defended where an iodine deficiency exists. The inclusion of such medicaments as turpentine, areca nut, etc., is wrong.

#### Cystine.

A good example of a nutritional problem is found in connection with the production of wool. Everyone wishes to increase the amount of wool per sheep, and many attempts have been made to do so. Analysis of wool has shown that the wool fibre contains an abnormally high percentage of the sulphur containing amino-acid cystine. This is one of the nineteen substances of which all proteins are comprised, and protein is one of the food constituents which enters very largely into the growth of wool. In wool from all breeds and localities and of every quality cystine forms an invariable proportion of the dry wool fibre, viz., 13.1 per cent. The moisture in scoured and dried wool forms about 16 per cent., so that in ordinary commercial scoured wool cystine occurs to the extent of 11.29, or, in round figures, 11 per cent., of which three-tenths (or about 3.4 per cent. of scoured wool) is actually sulphur. This percentage of cystine is most unusual and is far above the cystine found in other proteins, especially those generally found in pastures.

Now, it is a fact proved beyond all dispute that cystine cannot be manufactured by animals from other sources of sulphur and nitrogen. When the sheep are fed on a diet which contains too little cystine in the plants they eat, cystine becomes the limiting factor for growth. Since cystine cannot be manufactured by animals, it must be obtained by them preformed in the diet. Sheep must, therefore, obtain cystine from the proteins or other cystine compounds in the fodder. No other source of sulphur found in nature will satisfy the need. The problem of how to supply the sheep with cystine is one of vast importance and its solution does not appear to lie with pasture improvement. Pasture improvement will certainly increase the amount of cystine in the pastures, but it will not increase the proportion of cystine to the other constituents. We want a food which will contain more cystine to the pound of fodder protein. If we could introduce into our pastures high cystine-producing fodder plants we should not only get more wool, but should also be able to carry more sheep to the acre.

The amount of cystine present in a patsure is the limiting factor in the production of wool, and in order to supply it to the sheep it is necessary either to introduce plants containing higher percentages of cystine, or else to feed concentrates which contain it. The plants may be obtained, but we have no knowledge of them at present. On the other hand, a concentrate obtained from the waste material of slaughter-houses is already on the market. It is known as "Cystine OS," is prepared from wool, hair, horns and hoofs, and is guaranteed to contain not less than 3 per cent. of cystine. By feeding this to sheep it has been found that the wool yield has been considerably increased. It is also found through experiments conducted by the Council of Scientific and Industrial Research that the increased production obtained by this means is a paying proposition. Just a word of warning. It is, of course, a fact that sulphur has to be supplied to sheep, as it enters so largely into the composition of wool. It is quite useless, however, to feed sulphur in any other form than in that which I have indicated. Giving flowers of sulphur in licks is so much waste, as it passes through the animal practically unchanged. Giving it to sheep is a good means of supplying sulphur to the soil by distributing it through the faeces.

#### The Value of Bone Meal.

The beneficial effect of supplying a mineral supplement where a deficiency of lime and phosphoric acid exists is shown by increased growth and production and also in the prevention of disease. An extensive series of tests carried out by Thieler, Du Toit and Green in South Africa on animals grazing on pastures markedly deficient in phosphorus showed very marked results.

The following table shows the effect of feeding bone meal and salt (supplying lime, phosphorus, sodium and chlorine) on the growth of cattle.

Weight.	Animal	Animal	Animal	Animal
	No. 518.	No. 475.	No. 502.	No 528.
January, 1922 May, 1923	lb. 310 755	lb. 319 465	lb. 304 726	lb. 297 451
Increase	445	146	422	154
Bone meal rations	3 oz.	Nil	3 oz.	Nil

It will be seen that the administration of 3 oz. of bone meal a day made a difference in the growth of, roughly, 300 lb. as compared with the animals not receiving the extra mineral. Further, when killed and dressed it was found that the animals receiving the bone meal had a larger proportion of their live weight in the form of butcher's meat than the others. They carried more meat and fat in proportion to skeleton and entrails, and the muscle fibres were more liberally interlarded with fat. It is obvious from those results that phosphorus was the limiting factor for the utilisation of

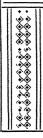


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those food constituents in the pasture which are transformed to meat and fat. By giving 3 oz. of bone meal not only was the total weight increased but also the killing weight, while it is almost certain there would be an improved nutritional value in the meat due to the increase of inorganic phosphorus in the tissues.

Tests with cows on the same mineral deficient area showed that the feeding of bone meal was accompanied by a 40 per cent. Increase in the milk yield compared with controls receiving no bone meal. Results somewhat similar have been obtained in various parts of the world with sheep fed on mineral deficient pastures. In these experiments it has been shown that the lambs of ewes which were fed the mineral mixture were heavier than those of "control" ewes grazing on the same pastures, and the fleeces were from 5 to 10 per cent. heavier. In the South African experiments it was noted that the calves of the bone meal fed cows were from 10 to 20 per cent. heavier than those of the controls which received no bone meal. One of the most remarkable results of the tests in feeding bone meal was the decreased mortality in the bone meal fed groups as compared with the controls.

#### Mineral Essential for Quick Growth.

I have mentioned that the breeders are aiming at quicker-growing types of animals and have also pointed out that these types require food of higher quality. This is especially the case with minerals. A good example of how nature arranges the supply of minerals to quick-growing animals is furnished by the examination of milk of various species, as shown in the following table:—

RELATION	of Mineral	Content of	Milk to Ro	te of Growth.

Species.			Time taken to double weight after birth.	Ash content of the different milks.
Man Cow Pig Rabbit		•••	47 14	per cent. 0·25 0·72 1·03 2·50

It is seen that in the milk of the faster-growing species the percentage of ash is higher. In accordance with this law, mineral-rich pastures are required to keep rapidly-growing animals in health and if the pastures are not mineral rich then minerals must also be fed to the animals if we want the best results.

To sum up, it seems clear that where pastures are mineral deficient supplementary mineral feeding prevents such diseases as rickets, bone-chewing, botulism (forage poisoning), increases the production of meat, milk and wool, and has a noticeably good effect on the progeny of animals which are regularly supplied with mineral mixtures. Incidentally, the provision of a bone meal lick to sheep for a fortnight before drenching for fluke with carbon-tetrachloride will prevent, to a great extent, deaths following that treatment.

#### Excess of Protein is Harmful.

As examples of dietetic diseases which are fairly easy to control let us take the sheep diseases known as pulpy kidney in lambs and parturient toxemia, or twin disease, in ewes. Both these diseases, which are believed to be caused by an excessive amount of protein in the ration, can be prevented by suitable management. In this connection it is perhaps necessary to explain that there is a danger in feeding an excess of protein to animals. Damage from excess may occur in two ways: (1) Injury to the kidneys. (2) auto intoxication. If the amount of protein fed is in excess of the animal's ability to utilise it, the whole of the excess is excreted and the major portion of the protein eliminated is by means of the kidneys. Feeding an excess of protein, therefore, throws an extra burden on the kidneys. Foods like cakes and meals made from oil seeds, which are excessively rich in protein and also expensive, but which are given to sheep in drought time. often cause the animals to die with diseased kidneys, and show albuminous urine in their bladders. Again, protein in excess undergoes putrefactive changes in the intestines resulting in the formation of a number of complex nitrogenous substances, many of which are toxic.

#### Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36A, G.P.O., Sydney, not later than the 12th of the month.

Maize—
Large Goldmine ... P. Short, "Moore Park," Armidale.

Sorghum—
Sumac ... ... Manager, Experiment Farm, Bathurst.
Saccaline ... ... Manager, Experiment Farm, Grafton.
Collier ... Manager, Experiment Farm, Grafton.

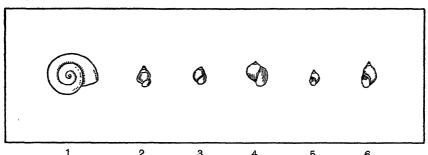
A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

#### Notes on the Snail Carrier of the Liver Fluke and Other Fresh-water Snails.

GRAHAME EDGAR, B.V.Sc., Veterinary Research Officer, Veterinary Research Station, Glenfield.

FRESH-WATER snails are of importance to stockowners, owing to the fact that one of them, viz., Limnaea brazieri, has been found to act as the intermediate host of the liver fluke. The following notes have, therefore, been put together in order that persons who are interested may have some information regarding the snails they are likely to come across. None of the snails mentioned other than Limnaea brazieri is, at present, believed to act as a host of the liver fluke.

In the compilation of these notes the writer is much indebted for information kindly furnished by Mr. Tom Iredale, of the Australian Museum.



1 2 3 4 5 6 Types of Fresh-water Snails (approximately natural size). 1. Planorbis spp. 2. Gabbia australis. 3. Limnaea brazieri. 4. Limnaea lessoni. 6. Bullinus gibbosus.

#### Genus Bullinus.

This genus is recognised as consisting of left-handed snails, and is known to have a wide distribution in this State. It is composed of a large number of species, which vary greatly in their different characteristics, the species being the most difficult of all water snails to classify. It has been found that environmental influences exert a great effect upon the shape and form of this genus. For this reason the conchological recognition of the Bullinus species is rendered exceedingly difficult, but in view of the fact that it has so far not been found to act as an intermediate host of parasitic trematodes, little attention need be paid to its occurrence.

#### Genus Limnaea.

So far as is at present known, only two species of this genus occur in this State. They are *Limnaea brazieri* and *L. lessoni*. Both types are right-handed snails, and little difference exists so far as their natural habitats are concerned.

It is an established fact that L. brazieri acts as the intermediate host of Fasciola hepatica in this State, but L. lessoni has not been incriminated in this direction.

Upon casual observation little difference can be detected between these two species. The main points of recognition are that in L. lessoni the opening, or peritreme, of the shell is distinctly wider when compared with the same feature in L. brazieri. A more outstanding difference is the decided twist and prominence of the columella (the first coil of the spiral) in L. lessoni compared with that in the shell of L. brazieri; also L. lessoni attains much greater size and specimens have been found as large as the garden snail Helix. The white colour of the shell in L. lessoni is also another noteworthy feature, whereas in L. brazieri the shell of both the dead and live animal is always brown. The two types of Linnaea, however, are never found together; they remain strictly in colonies, although at times they are found in different pools within close proximity of each other.

Recently specimens of *L. lessoni* were secured in galvanised-iron tanks at Narrabri. These tanks were above ground, and the water in them was about 5 feet deep. The snails were chiefly adhering to the sides of the tanks, not only near the surface, but as far as the arm could reach, *i.e.*, about 20 inches below the surface. A number of live snails were also seen floating on the surface of the water, they apparently remaining buoyant owing to the presence in them of readily-detected gas bubbles.

Limnaea brazieri is frequently found in springs, at the heads of small streams and in small pot holes on the edges of larger streams. It is seldom seen in rapidly running water, but at times may be found under stones in shallow, just running streams. Watercourses overgrown with watercress commonly harbour this snail.

#### Genus Planorbis.

A fairly large number of species of this genus exist in New South Wales, but in comparison they are not so common as either Bullinus or Limnaea. These snails can be readily recognised in that the shells are flattened horizontally, with the coil of the spiral starting from the centre and terminating with the opening or peritreme outwards. It has not been established that this genus plays any significant part in the life history of Fasciola hepatica.

#### Genus Gabbia.

The most common species of this genus, Gabbia australis, is found fairly extensively in this State. It is a relatively small, right-handed snail, and can be readily distinguished from Limnaea by the appearance of the peritreme, which is oval and operculated. This snail is highly resistant to external influences owing to the presence of this operculum, and is capable of resisting desiccation for several months. It does not act as an intermediate host of the fluke in this State, but it is of interest to note that in New Zealand, Polaniopyrgus antipodum, which very closely resembles Gabbia australis, is strongly suspected of being the intermediate host in that country.

Gabbia australis is very frequently encountered in the Northern Tablelands. It has been observed occurring in two separate pools at the Glenfield Veterinary Research Station, and in one pool it was found in company with a Bullinus species. Gabbia australis may readily be mistaken for pieces of gravel in the bottom of a pool. It moves only very slowly, is frequently mud-covered, and possesses few features which, upon a cursory examination, enable it to be recognised as a mollusc.

#### Genus Succinea.

This genus is also characterised by being a right-handed snail. The common species, Succinea australis, has been noticed on the Southern Tablelands of this State. It is amphibious and is usually found out of water, in damp situations under logs and decaying vegetation. The snail resembles Limnaea, but its habitat gives an indication as to its identity.

#### GASSY MILK.

An interesting case of typical milk contamination by gas-producing bacteria was located recently by a Senior Dairy Instructor of the Dairy Branch, Department of Agriculture.

While carrying out check grading of milk quality at a cheese factory, a batch of cheese milk proved to be badly infected with gas producing bacteria and the source of contamination was traced by means of the Wisconsin curd test to one supplier's milk. The usual corrective methods advocated for adoption on the farm failed to remedy matters, even when machine-milking was temporarily suspended to determine whether infection was coming from that source. As the trouble persisted, the officer concerned decided to submit the milk from each cow in the farmer's herd to the curd test, with the result that out of forty samples tested, twelve cows only proved to be giving infected milk. Observation of the cows' movements during the day revealed that they fed on the flats during the morning and from midday on they camped in one particular spot, under a tree on the hillside. This camping ground surrounding the tree had practically become a manure heap. Intestinal organisms, usually responsible for gassy curds, were evidently carried by the cows in the dust which adhered to their coats, udders, and in the ducts of the teats. Careful washing of the udders and stripping from each teat the first few drops of milk before attaching the machines to the cows proved successful in eliminating the trouble.

Similar sources of milk contamination by intestinal organisms which produce fermentation detrimental to cheese-making frequently occur and could be easily prevented if every dairy farmer adopted the simple practice of cleaning and wiping each cow's udder with a cloth wrung out of water containing some odourless germicide, followed by withdrawing and rejecting the first ductful of milk from the cow's udder before commencing to milk the cows by machines or hand.

In the case referred to, the additional precaution was taken of preventing the cows from resting on the camping ground for a few days until the surroundings were cleaned up, with the result that when a later visit was made by the Dairy Instructor a vigorous growth of grass had appeared.

A. B. Shelton, Senior Dairy Instructor.

#### TUBERCLE-FREE HERDS.

Or the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

O and Address		Number	Expiry date of this
Owner and Address.		tested.	Certification.
		+	Outstate
. L. W. Barton, Wallerawang		18	9 Oct., 1930
Placed Chanel's Seminary Mittagong		5	25 , 1930
Riverstone Meat Co., Riverstone Meat Works, Riverstone		115	27 , 1930
f. R. Chaffey, Glen Innes (Avrshires)	•	56	29 , 1930
T. A. Corderov, Wyuna Park, Comboyne (Geurnseys)		54	1 Nov., 1930
New England Experiment Farm, Glen Innes (Ayrshires)	•••	62	3 ,, 1930
3. G. Winkley, Dorrigo		85	8 ,, 1930
I. Davies, Puen Buen, Scone (Jerseys)	•••	40	11 ,, 1930
Department of Education, Brush Farm, Eastwood	•••	7	22 ,, 1930
Lunacy Department, Callan Park Mental Hospital	***	28	29 ,, 1930 1 Dec., 1930
Bathurst Experiment Farm (Jerseys)		30 24	1 Dec., 1930 7 Jan., 1931
Lunacy Department, Morisset Mental Hospital		00	7 1001
C. J. Parbery, Allawah, Bega		70	77 7001
Kinross Bros., Minnamurra, Inverell (Geurnseys)		0.4	10 " 1001
New England Girls' Grammar School, Armidale		90	00 1091
Lunacy Department, Parramatta Mental Hospital		70	30 1931
W. M. McLean, Five Islands Rd., Unanderra		10	19 Feb., 1931
Miss Brennan, Arrankamp, Bowra! Department of Education, Yanco Agricultural High School	•••	33	21 ,, 1931
Department of Education, Issue Agricultural Ingli School	•••	103	27 , 1931
G. A. Parish, Jerseyland, Berry Lunacy Department, Kenmore Mental Mospital	•••	76	28 , 1931
Hawkesbury Agricultural College (Jerseys)	•••	160	1 Mar., 1931
St. Joseph's Girls' Orphanage, Kenmore	•••	10	3 ,, 1931
St. Michael's Novitiate, Goulburn	•••	5	3 ,, 1931
Kyong School, Moss Vale	•••	8	4 ,, 1931
St. Joseph's Convent, Reynold-street, Goulburn		4	4 ,, 1931
St. John's Boys Orphanage, Goulburn	***	7	5 ,, 1931
Marion Hill Convent of Mercy, Goulburn	•••	10	6 ,, 1931
Cowra Experiment Farm	•••	29	6 ,, 1931
Riverina Welfare Farm, Yanco	•••	69	6 , 1931
Wilkins, James, Jerseyville, Muswellbrook	•••	51	12 ,, 1931
Tudgr House School, Moss Vale	•••	8	21 ,, 1931
H. F. White, Bald Blair, Guyra (Aberdeen Angus)	***	202	3 April, 193
Grafton Experiment Farm (Ayrshires)	•••	180	5 , 193 10 193
Department of Education, Huristone Agricultural High School		45	00 700
Navua Ltd., Grose Wold, via Richmond (Jerseys)	•••	45	30 193
Australian Missionary College, Cooranbong	•••	1 0	1 May, 193
J. P. McQuillan, Bethungra Hotel, Bethungra	•••		00 400
George Rose, Aylmerton William Thompson, Masonic School, Baulkham Hills	***	46	100 100
Department of Education, Gosford Farm Homes	***	90	3 June, 193
F. C. Kershaw, Macquarie House, Macquarie Fields	***	71	5 ,, 193
P. Ubrihlen, Corridgeree, Bega	***	114	6 , 193
Gladesville Mental Hospital	***	42	08 " 100
A. L. Logue, Thornbro, Muswellbrook	***	40	23 July, 198
Webb, A. H., Quarry-road, Ryde	Y	4	26 ,, 198
A. Shaw, Barrington (Milking Shorthorns)	•••	122	9 Aug., 198
E. P. Perry, Nundorah, Parkville (Geurnseys)	***	22	18 ,, 198
Wagga Experiment Farm (Jerseys)		55	14 198
Sacred Heart Convent, Bowral	***	12	20 198
St. Patrick's College, Goulburn	***	8	22 . 193
Walter Burke, Bellefaire Stud Farm, Appin (Jerseys)	•••	46	22 ,, 198
H. W. Burton Bradley, Sherwood Farm, Moorland (Jerseys)	***	81	12 Sept., 193
J. F. Dowe, "Woolomol," Tamworth S. L. Wills, Greendale Dairy, Cowra	***	42	19 ,, 193
S. I. WHIR. UTERTICALE DAILY, COMPA	***	24	19 ,, 193
Wolarai College, Orange		10	4 Oct., 193

-Max Henry, Chief Veterinary Surgeon.

A NEW edition of Farmers' Bulletin 161 ("Testing Milk and Cream") is now available. It is obtainable either from the Government Printer, Phillipstreet, Sydney, or from the Department of Agriculture, Box 36A, G.P.O., Sydney; price 1s. 2d., including postage.

# Wheats Entered for the Royal Agricultural Society's Show, 1930.

RESULTS OF MILLING TESTS.

G. W. NORRIS, Assistant Analyst, Chemist's Branch.

THE wheat exhibits were displayed in the Farrer Court as in previous years. The samples were arranged in their various classes in small show cases on both sides, while the mill products from the individual samples were shown in glass tubes at the end of the court, making a good display.

A graded sample of commercial wheat, together with the rubbish contained in a bushel sample, looked very inferior when compared with the show exhibits. It afforded a striking example, and suggested that the time has arrived when a grading system should be adopted. It clearly demonstrated the large amount of rubbish that a bushel of commercial wheat contains, and it does not require an expert to realise what a tremendous amount of money is paid annually for this rubbish, even in an average season.

The standard of the wheat generally was very similar to that of last year, as a few comparisons will show. In the Commonwealth classes, for example, there was a slight improvement in the gluten content. For instance, in the strong white wheats, the average water absorption (53 last year) was 52 this year; the gluten content, however, showed an increase from 12.3 to 13 per cent. In the medium strong wheat class, a similar variation was noticeable; the average water absorption (47.2 last year) was 46.2 this year, while the gluten content showed an increase from 10.8 to 11.9 per cent.

While great credit must be given to the growers, for their choice of varieties and the great care taken in the preparation of their exhibits, the Royal Agricultural Society must also be commended for encouraging the growers to keep up the quality of the wheats.

#### RESULTS OF MILLING AND FLOUR TESTS.

	Appear- ance of Grain.	Weigh bus	ht per hel.	Ease of Milling	Percentage of Flour.		Colour of flour.		ntage uten.	Strength.		Total
	_	Points.	Actual Weight.	-	Points.	Actual per cent.	_	Points.	Actual per cent.	Points.	Water Absorp- tion.	Pts.
Max Points.	10	15	_	10	10		15	20	_	20	_	100
Cat. No.	Cla	ass 1810	) (Com	nonwea	lth Cha	mpion	Prize	-Stroi	ng Whi	te Whe	at).	1
8949	7	13	661	8.	10	74.0	12	17	13.2	191	54.4	861
8950	9	131	66 <u>1</u>	8	10	74.5	10	151	.11.5	19	54.0	85
8951	7	121	651	10	10	74.4	14	18	14.0	16	51.2	871
8953	7	12	65 <del>1</del>	10	10	75.3	12	16	12.3	151	50.8	821
8954	10	14	671	8	10	73.9	14	17	13.2	171	52.4	901
8955	9	14	67	9	10	75-0	12	19#	15.7	18	53.0	911
8956	8	. 134	661	10	10	74.3	12	15	11.0	151	50.8	84
8970	8	13 <del>\texts</del>	66 <del>1</del>	10	10	74-7	14	161	12.7	17	52-0	89
8993	9	13	66 <u>1</u>	10	10	75.7	15	171	13.8	15	50-0	84 89 891

#### Results of Milling and Flour Tests—continued.

	Appear- ance of Grain.	Weigh bus		Ease of Milling	Percentage of Flour.		Colour of flour.	Percentage of Gluten.		Strength.		Total
	_	Points.	Actual Weight.	-	Points,	Actual per cent.	_	Points.	Actual per cent.	Points.	Water Absorp- tion.	Pts.
Max Points.	10	15	_	10	10		15	20		20	_	100

Class 1311 (Comp	nonwealth Champ	ion Prize-Mediur	a Strong Wheat).
------------------	-----------------	------------------	------------------

•												
8957	9	13}	661	10	10	74.3	13	14 } 13 }	10.7	12	47.1	82
8958	9	$12\frac{7}{2}$	654	10	10	74.0	12	131	9.6	Il	46.0	78
8959	7	11	64	9	9	73.3	14	16]	12.5	11	46.0	775
8960	9	14	671	10	10	75.7	14	13]	9-7	11	46.0	81 <u>‡</u>
8961	8	111	641	10	10	75.2	14	141	10.6	10}	45.8	78 <del>1</del>
8962	8	11	64	9	91	73.5	12	15	11.2	12	47.0	$76\frac{7}{2}$
8963	9	11	64	10	10	74.2	15	14	10.3	11	46.2	80
8964	9	13	66	10	10	75.7	14	16	12.2	11	46.0	83
8965	10	144	671	9	10	75.0	12	191	15.7	Ω	44.0	84
8966	10	141	67 <del>1</del>	9	10	74.8	14	14	10.3	101	45.6	82
8967	7	12	65	10	10	75.6	12	141	10.5	9~	44.0	$74\frac{1}{2}$
8968	7	114	641	10	10	74.3	12	$13\frac{7}{2}$	9.5	11	46.0	75
8969	8	121	65 <del>1</del>	10	10	74.2	13	161	12.5	114	46.4	81 <del>1</del>
8971	9	111	64 <del>8</del>	10	10	74.6	14	16	11.8	$12\frac{7}{2}$	47.4	. 83
8972	8	104	63 <del>2</del>	10	10	74.5	13	15	10.9	11	46.2	771
8973	7	115	641	10	10	74.8	14	15	11.0	10	45.0	77 🖟
8974	7	11	64 <u>7</u>	10	9	73.2	14	15	11.0	111	46.4	$77\frac{7}{2}$
8975	9	13	66 <u>1</u>	10	10	75.3	15	161	12.7	101	45.6	84
8976	10	131	66 <del>1</del>	10	10	74.5	14	141	10.5	91	44.6	811
8977	7	12	65~	10	10	74.0	15	15	11.1	10	45.0	79
8978	8	131	662	10	10	74.8	12	144	10.5	141	49.4	821
8979	8 8	124	65 <del>1</del>	10	10	74.4	15	17	13.0	11	46-0	$83\frac{7}{2}$
8980	8	111	64 <del>3</del>	10	10	73.9	12	151	11.5	12	47.0	79
8981	7	11	64 <del>1</del>	10	8	72.1	15	15%	11.5	111	46.6	78
8982	9	111	641	10	10	74.5	14	141	10.5	11	46.0	80
8983	8	101	63 <del>2</del>	10	91	73.7	13	16	12.6	101	45.8	78
8984	8	13	66	10	10	75-1	12	16	12.0	101	45.6	791
8985	9	14	67	10	10	73.8	13	16	12-1	13	48-0	85
8986	8	121	651	10	10	75.0	15	16	12.2	81	43.4	80
8987	10	14	671	10	10	73.8	14	15	11.2	101	45.6	831
8988	9	13	66	10	10	74.5	14	17	13.3	101	45.6	831
8989	8	10	631	10	91	73.3	14	17	13.0	11	46.0	791
8990	8	12	651	10	10	74.6	15	16	12.2	11	46.0	82
8991	9	12	65	10	10	74.9	12	17	13.1	11	46.2	811
8992	8	13	66	10	10	75.0	14	151	11.8	ii	460	811
8994	7	101	631	10	10	75.4	14	17	13.2	111	46.4	80
8995	8	111	64	10	10	74.3	13	171	13.6	10	45.0	791

#### Class 1812 (Florence) [Special].

 $8996 \mid \ 10 \ \mid \ 14\frac{1}{2} \mid \ 67\frac{1}{2} \mid \ 9 \mid \ 10 \mid \ 75 \cdot 0 \mid 12 \mid \ 19\frac{1}{2} \mid \ 15 \cdot 7 \mid \ 9 \mid \ 44 \cdot 0 \mid \ 84$ 

#### Class 1813 (Canberra) [Special].

8997 8998 8999 9000 9001 9003	10 10 9 10 9 8	131 141 131 131 121 121 121	663 673 661 661 651 651 64	10 10 10 10 10 10	10 91 10 10 10 10	74·7 73·7 74·4 74·5 74·4 75·0 74·3	14 13 14 14 15 15	14 16 151 141 17 16 171	10·0 12·0 11·5 10·5 13·0 12·2 13·6	9 10 101 91 11 81 10	44.0 45.0 45.4 44.4 46.0 43.4 45.0	80½ 83 82½ 81½ 83½ 80 79½
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#### A REDUCTION OF £1 11s. 6d.

per ton in the price of

#### SULPHATE OF AMMONIA

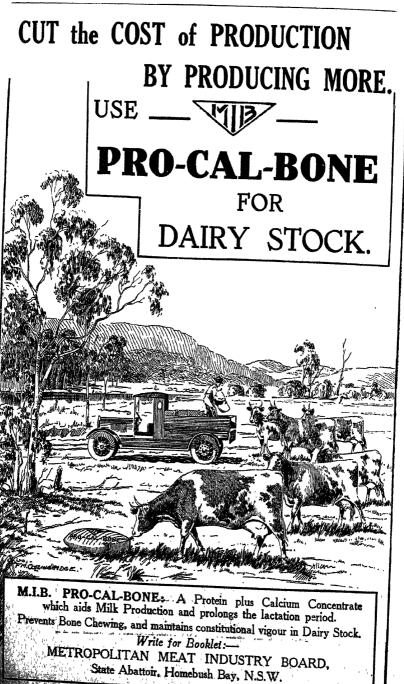
will take effect as from the 1st July.

The new price will be £12 12s. per ton free on rails, less  $2\frac{1}{2}$  % for cash, and at this price supplies of Sulphate of Ammonia can be obtained, as usual, from all fertiliser manufacturers or their agents, or direct from the Australian Gas Light Co., Haymarket, Sydney; or the Broken Hill Proprietary Co., Ltd., Newcastle.

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Melbourne



## Results of Milling and Flour Tests—continued.

$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	th. Total	Stre	ntage uten.	Perce of Gi	Colour of flour.	ntage lour.	Perce of F	Ease of Milling	nt per hel.	Weigl bus	Appear- ance of Grain.	
Class 1314 (Waratah [Special].  Class 1314 (Waratah [Special].  9008 9 14 67 $\frac{1}{4}$ 10 10 75·3 13 14 $\frac{1}{4}$ 10·8 11 46·0 81 9011 10 14 67 $\frac{1}{4}$ 10 10 74·6 14 17 13·1 10 45·2 88 9016 10 13 66 $\frac{1}{4}$ 10 10 74·5 15 18 $\frac{1}{4}$ 14·5 11 46·0 87 9019 10 14 67 10 10 75·7 15 16 12·0 11 46·0 86 9020 9 13 66 10 10 75·4 15 16 12·0 11 46·0 86 9022 9 13 66 10 10 75·4 15 17 13·0 10 $\frac{1}{4}$ 45·8 85 9022 9 13 66 10 10 74·4 15 17 13·0 10 $\frac{1}{4}$ 45·4 84 Class 1315 (Nabawa) [Special].	Water Pts. bsorp-	Points.	per	Points.		per	Points.	_		Points.	_	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	_ 100	20	_	20	15	<b> </b>	10	10	_	15	10	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				ecial].	[Sp	Varatah	1814 (V	Class				-
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	46-0   811	11	10.8							14	9 [	9008
9019   10   14   67   10   10   75·7   15   16   12·0   11   46·0   86 9020   9   13   66   10   10   75·4   15   16   12·2   10½   45·8   83 9022   9   13   66   10   10   74·4   15   17   13·0   10½   45·4   84 Class 1315 (Nabawa) [Special].	45.2 85								671		1	
9020 9 13 66 10 10 75.4 15 16 12.2 101 45.8 83 9022 9 13 66 10 10 74.4 15 17 13.0 101 45.4 84 Class 1315 (Nabawa) [Special].				16					67			
Class 1315 (Nabawa) [Special].	45.8 831	101										
	45.4   841	101	13.0	; 17	15	74.4	10	10	66	13	9	9022
00000 0 1 101 1 000 1 10 1 10 1 MAN 1 10 1 301 1 0 0 1 11 1 400 1 W	44.0 1 50	, ,,							0.53	701 1	0 1	0000
9029 7   $11\frac{1}{2}$   $64\frac{1}{2}$   $10$   $10$   $74\cdot3$   $12$   $13\frac{1}{2}$   $9\cdot5$   $11$   $46\cdot0$   $75$					12				641	111	7	
								1				
		1										
		111	13.2	17	14	75.4	10	10	$63\frac{1}{2}$	$10\frac{1}{2}$	7	9036
Class 1316 (Bena) [Special].				ial].	Spec	(Bena)	s 1316	Clas				
9039 9 12 651 10 8 72.2 14 15 11.3 11 46.0 79							8		651			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		102					8			112		
Class 1317 (Novice).	2001 10	,2						•	V-4 1	,	• ,	(
	47.4   82	10	10.7	141	•	•			gg1 (	191 1	0 (	0045
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				14						131		
9051 9 14 67 $\frac{1}{2}$ 10 10 75.7 14 13 $\frac{1}{2}$ 9.7 11 46.0 81			9.7	13 <del>1</del>					67Ī	14	9	
									651			
							1					
9057 9 $13\frac{7}{2}$ $66\frac{7}{2}$ 10 10 $74\cdot4$ 14 $15\frac{7}{2}$ 11·5 $10\frac{1}{2}$ 45·4 82							10		66 <del>1</del>			
												- : 1
				16							- 1	
										131		
9063   9   13   66   9   10   73-8   14   16   12-1   11   46-0   82	46.0 82	11		16					66	13		
				7.7								
9070 8 10 631 10 91 73.3 14 17 13.0 11 46.0 79	46-0 791								631			
							77 1					
Class 1818 (Federation) [Special].	•			pecial].	n) [S <sub>]</sub>	deratio	818 ( <b>F</b> e	Class 1				
9079   9   12½   65¾   10   9½   73·7   15   15   11·1   8   43·2   79									653			
									671		1	
9083 9 12½ 65½ 10 9½ 73-5 15 17 13-1 9 44-2 82	TT 4   04	<i>3</i>	19.1	1.1	10	19-0	2 <u>5</u> ]	10	00g	147	<b>3</b>	2000

	Appear	Weig	ht per	Ease of	Perce		Colour,		ntage	Stren	ogth.	<del></del> -
	ance of Grain.	bus	shel.	Milling	of F	lour.	25	of G	luten.			Total
	_	Points.	Actual Weight.	_	Points.	Actual per cent.		Points.	Actual per cent.	Points.	Water Absorp- tion	Pts.
Max. Points.	10	15	-	10	10	_	15	20		20	_	100
			CI.	nec 121	9 (Hard	Fodore	ation'	Sneei	el7			
0000	<b>,</b>	11		ass 101   9	٠.	73·3	14	16 <del>1</del>		111	46.0	773
9088   9089	7 8	11 11	64 64	9	91	73.5	12	15	11.2	12	47.0	763
9090	10	14 <u>3</u>	671	9	10	74.8	14	14	10.3	101	45.6	82
9091	9	13	66	9	10	73.8	14	16	12.1	11	46.0	82
				Class	<b>1320</b> (	Weak 1	lour	).				
9092	10	15	681	10	$9\frac{1}{2}$	73.7	12	14	10.2	9	44.2	791
9093	9	14	671	10	10	75.3	13	141	10.8	11	46.0	812
9097	. 9	$12\frac{1}{2}$	653	10	$9\frac{1}{2}$	73.7	15	15	11.1	8	43.2	79
9098	10	14	671	10	10	74.4	14	16 17	12.0	9	43.4	83
9099 9100	10 10	1 <u>4</u> 11	67± 64	10 10	10	74·6 74·3	14	13	9.0	10	45·2 45·2	85 76
9101	10	13	661	10	10	75.3	14	16	12.2	8	43.0	81
9108	9	121	651	10	93	73.5	15	17	13.1	9	44.2	82
9111	9	13	66	10	102	75.4	15	16	12.2	101	45.8	831
			(	Olass 13	23 (Str	ong Wh	ite)	[Specia	d].			
9123	7	13	661	8	10	74.0	12	17	13.2	19½	54.4	86 <u>₹</u>
			C	lass 13	24 (Med	ium St	rong)	[S peci:	al].			
9124	9	121	663	10	10	74.0	12	131	9.6	11	46· <b>0</b>	78
9126	9	11	64	10	10	74.2	15	14	10.3	11	46.2	80
9127	9	13	66	10	10	75.7	14	16	12.2	11	46.0	83
9128	10	141	672	10	91	73.7	13	16	12.0	10	45.0	83
9129 9130	8 10	$\frac{12\frac{7}{2}}{13}$	651	10	10	74.2	13	$16\frac{1}{2}$	12.5	111	46.4	817
9132	9	1111	66	10 10	10 10	75.4	15	15	11.1	11	46.0	84
9133	8	101	633	10	10	74.6	14	16 15	11-8	121	47.4	83
9134	7	111	641	10	10	74.8	14	15	10.9	111	46.2	77
9135	7	112	641	10	9	73.2	14	15	11.0	114	46.4	
9136	. 9	13	66	10	10	75.3	15	163	12.7	101	45.6	
9137	9	111	641	10	10	74.5	14	145	10-5	lii*	46.0	
9140	9	14	67	10	10	73.8	13	16	12.1	13	48-0	
9143 9145	8 7	10 10 <del>1</del>	631	10	91	73.3	14	17	13.0		46.0	
0.130	, ,	TOP	63½	10	10	75.4	14	17	13.2	111	46.4	80
				Class 1	1825 (W	eak Flo	our) [	Special	].			
9146	10	12	65	10	10	74.8			11.2		45-6	81 <u>1</u>
9148 9154	10	131	661	10	10	74.8	15	15	11.2	111	46.4	:   85
0155	10	14	671	10	10	74-6	14	,	13.1		45.2	
9160	10	13	661	10	10	74·3	12	13	9-0		45.2	
9169	10	14	87	10	10	14.0	15	181	14.5	11	46.0	87

## RESULT OF EXAMINATION OF THE WHEATS IN CLASSES WHICH WERE NOT SUBMITTED TO A MILLING TEST.

	**	Weight p	er bushel.	Appear-	Trueness	Uniform-	Total
Catalogue No.	Variety.	Actual Weight.	Points.	ance of Grain.	to Type.	ity of Grain.	Pomts.
i	Maximum Points		15	10	10	10	45
	Canberra	673	$14\frac{1}{2}$	Wheats).	10	10	441
9117 {	Florence Federation Hard Federation Waratah	67½ 67½ 67½ 67¼	14½ 14½ 14½ 14½ 14	10 10 10 10	10 10 10 10	10 10 10 10	44½ 44½ 44½ 44
			-				222
9118	Bobs Canberra Comeback Federation Waratah	651	13½ 14 14 12½ 14	8 10 9 8 10	10 10 10 8 10	10 10 10 8 10	41½ 44 43 36½ 44
			1			:	209
ſ	Class 1322 Free Gallipoli	653	124	1 8	9	8	$37\frac{1}{2}$
9119	Gresley Major Minister Moira	643	$ \begin{array}{c c} 13\frac{7}{2} \\ 11\frac{1}{2} \\ 12 \\ 12\frac{1}{2} \end{array} $	8 8 7 8	10 8 9 8	9 8 9 8	40½ 35½ 37 36½
	l	1					187
9120 {	Canimbla Ford Marshall's No. 3 Nizam Penny	. 66	12½ 11 10¼ 13 11	10 6 8 8 8	10 10 8 9 9	10 10 8 9 8	42½ 37 34½ 39 36
					1		189
9121 {	Early Bird Gullum Petatz Surprise Pusa No. 4 Quality	. 67 . 671 . 661	15 14 14 13 <u>1</u> 12	10 9 8 9 9	10 9 10 10 10	10 10 10 10 10	45 42 42 42 42 41
							212 <del>1</del>
9122 {	Ford Marshall's No. 3 Perfection Quality Queen Fan	. 66½ . 66½	12½ 13 13 13 13	7 8 10 8 8	8 8 10 10 10	8 8 10 10	35½ 37 43 41 41
-			·				1961

#### Comments.

The Strong White Championship was won by Mr. S. Pollock, of Glengarry, N.S.W., with the consistent prize-winner, Comeback—a wheat with outstanding qualities. It yielded a flour rich in gluten (15.7 per cent.), and with a water absorption equal to 53 quarts per sack of 200 lb. Scoring a total of 91½ points it was closely followed by the Indian champion Pusa No. 4, with 90½ points, exhibited by Mr. V. L. Pilditch, of Narrabri.

The Medium Strong Championship was won by Mr. J. E. Peachey, of Kelvin, N.S.W., with a splendid sample of Clarendon, scoring a total 55 points. This is an attractive wheat, yielding flour readily; it is rich in gluten, of good colour, and satisfactory water absorption. Mr. J. W. Eade, of Euchareena, with a sample of Florence, and Mr. E. K. H. King, of Wagga, with a sample of Union, tied for second place, each scoring 84 points.

It was a pity that the Special Florence class did not attract a large entry, as Florence is a good show wheat. Mr. J. W. Eade, of Euchareena, had it to himself; his sample was not as strong as is usual with this variety. The outstanding feature of this sample was that the flour contained a very high percentage of gluten (15.17), while the water absorption of 44 was very low.

The Canberra class was keenly contested, only half a point separating first and second. The first prize was won by Messrs. Mailer Bros., of Trundle, with 83½ points, and the second by Mr. J. W. Eade with 83 points. Canberra is an excellent milling wheat, yielding a high percentage of flour, rich in gluten, and has a satisfactory water absorption.

The Waratah special class was very hard to judge, there being nineteen entries. After a close inspection the number was reduced to six, which were milled and points awarded for the various qualities. Only 1½ points separated the first four samples. Like Canberra, this wheat is of high commercial value. The first prize went to Mr. S. E. Nash, of Wollombeen, with 87½ points. Mr. S. Pollock, of Quirindi, with 86 points was awarded second prize.

The Nabawa class was well represented. Messrs. J. Stacey and Son, of Quairading, Western Australia, won with a grand total of 81 points, being closely followed by Mr. R. A. B. Webb, of Berrigan, N.S.W., with 80 points. There was a variation of only three points between the first six exhibits. The winning sample gave a high flour yield of almost 75 per cent., with a rich gluten content, and a water absorption of 46 quarts per sack. Nabawa is also a good commercial wheat, but it does not produce the rich yellow bloom of the flour produced by Waratah or Canberra.

The Bena class was not so well filled as some of the other classes. Messrs. Mailer Bros., of Trundle, secured first prize, scoring 81½ points, while Messrs. G. Duncan and Son, of Daysdale, were awarded second prize with 79 points.

In the novice class some very fine samples were shown. There were thirty entries, constituting a record, due to the fact that entry was not limited to one variety. The first prize went to Mr. S. E. Nash, with a sample of Duchess, grown at Wollombeen, which scored 90½ points. This is an attractive wheat; the entry yielded a large percentage of flour, containing 13.6 per cent. of dry gluten, and had a high water absorption of 51 quarts per sack. The second prize was won by Mr. J. D. Hammond, with a sample of Carrabin, grown at Kellerberrin, Western Australia, which scored 89 points. Carrabin, like Duchess, is a good quality wheat; the entry was rich in gluten, and had a high water absorption of 51 quarts per sack.

For the first time since the introduction of the Commonwealth championship classes, the whole of the judging was completed before the termination of the show.

In conclusion, I wish to thank Mr. R. M. Petrie, of the Chemist's Branch, for his assistance.

#### INFECTIOUS DISEASES REPORTED IN SEPTEMBER.

The following outbreaks of the more important infectious diseases were reported during the month of September, 1930:—

Anthrax	•••		***	•••	•••	1
Blackleg	•••		•••	***		5
Piroplasmosis (tick few	rer)		•••	•••		Nil.
Pleuro-pneumonia con	tagiosa	•••	•••		***	12
Swine fever	•••	,		***	. ***	Nil.
Contagious pneumonia				•••		3

-MAX HENRY, Chief Veterinary Surgeon.

#### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

1930. Murwillumbah (T. M. Kennedy) Nov. 19, 20. Lismore (H. Pritchard) ... ... Dec. 3, 4, 5. 1931. Mar. 5, 6, 7

" 6, 7

" 10, 11, 12

" 12, 13, 14

" 13, 14

" 13, 14

" 18, 19

" 19, 20, 21

" 24, 25

" 27, 28 Moss Vale (W. Holt)
Penrith (C. H. Fulton) ...
Mudgee (T. P. Gallagher)
Crookwell ...
Gresford (A. B. Brown) ...
Bowral Horse Show
Campbelltown ...
Macksville (G. Hughes) ...
Camden 9, 10 16, 17 24, 26 Jan. Dapto ... Albion Park ... ••• Kiama ••• \*\*\* ... ... 30, 31 Berry Wollongong (W. J. Cochrane) Liverpool (B. C. Fitzpatrick) 50, 51 5, 6, 7 6, 7 12, 13, 14 13, 14 17 to 21 Feb. ••• ,, Castle Hill (E. Black) Newcastle (P. Legoe) ... ,, Camden ... ... \*\* Camden
Goniburn
St. Ives (A. Pickering)
Batlow (C. S. Gregory)
Brookvale.
Kempsey (E. Mitchell)
Eichmond (B. B. Tate)
Casino (E. J. Pollock)
Wagga (F. H. Croaker) 18, 19 20, 21 20, 21 Milton ... Kangaroo Valley ... ... Granville (B. Hyslop) ... Maitland (M. A. Brown) ... Milton ••• ... \*\*\* ,, 24, 25 ,, 27, 28 April 15, 16, 17 ,, 28, 24, 25 May 5, 6, 7 Aug. 25, 28, 27 25 to 28 27, 28 ,, Blacktown (A. J. Greenaway) \*\*\* ,, 27, 28 3, 4 4, 5 Robertson ... ... Mar. Braidwood (H. E. Roberts)

# Codling Moth Experiments, 1929-30.

SUMMARY OF RESULTS OBTAINED AT BATHURST EXPERIMENT FARM.

S. L. ALLMAN, B.Sc.Agr., M.S., Assistant Entomologist.

The codling moth control experiments inaugurated at Bathurst Experiment Farm orchard in 1926 were continued during the past season. Confirmation of the benefits that follow the use of various white oil emulsions in combination with lead arsenate and results of the investigation of other possible means of control are items of particular interest in a review of the year's work. Tests of the relative efficiency of dusting versus spraying were carried out, this with the view, also, of possibly minimising the danger of excess arsenical residue by employing dust.

#### Experimental Conditions.

Climatic Conditions.—The season was a fair one, 1,174 points of rain falling from the time of the calyx application in mid-October to the harvesting in the first week of March. The rains of the previous summer (484 points) and winter were very limited, and in consequence the fruit this season was very small, particularly where heavy crops were carried. This factor made it impossible to judge the effects of the various treatments on the size of the fruit.

The Setting of Fruit.—The fruit setting in the main orchard was good. but in the trees under experiment more variable. This resulted from the necessity for omitting certain powdery mildew sprays, which led to a big increase of infestation by this fungus. The details of the numbers of fruit per plot of ten trees for the past four seasons are set out in the following table:-

				Nur	nber of fruit per	plot.
	Seaso	n.		Average.	Maximum.	Minimum
1926-27		***		2,782	6,527	1,604
1927-28	•••	•••		12,946	17,647	10,553
1928-29	·	•••	•••	1,610	5,848	166
1929-30	,**	•••, '	•	6,521	10,160	2,758
			,	1 1		

From these figures it is apparent that the 1929-30 crop approximated the average of the past four years, and may thus be regarded as a normal crop.

#### Field Experiments.

The following treatments were tested:—

Spraying Experiments-

- 1. Lead arsenate powder, 20 oz. in 50 gallons water—four applications.
- 2. Lead arsenate powder, 20 oz. in 50 gallons water—four applications; followed by two applications of white oil (A), one part in 80 parts

2A. Duplicate of No. 2, using Granny Smith apples.

3. Lead arsenate powder, 20 oz. in 50 gallons water—three applications; followed by three applications of white oil (A), one part in 80 parts

4. Lead arsenate powder, 20 oz. in 50 gallons water—six applications.

4. Lead arsenate powder, 20 oz. in 50 gallons water—six applications.
 5. Calyx spray, lead arsenate powder, 20 oz. in 50 gallons water; five cover sprays, lead arsenate powder, 20 oz. in 50 gallons water, plus white oil (A), one part in 80 parts water.
 6. Calyx spray, lead arsenate powder, 20 oz. in 50 gallons water; five cover sprays, lead arsenate powder, 20 oz. in 50 gallons water, plus white oil (B), one part in 80 parts water.
 7. Calcium arsenate powder, 20 oz. in 50 gallons water—six applications.
 8. Lead arsenate powder, 40 oz. in 50 gallons water—six applications.
 9. White oil (A), one part in 80 parts water, plus nicotine sulphate, one part in 800 parts water—six applications.
 10. Calyx spray, lead arsenate powder, 20 oz. in 50 gallons water; five cover sprays, lead arsenate powder, 20 oz. in 50 gallons water, plus miscible oil (C), one part in 80 parts water.
 11. Hellebore powder, 4 oz. per gallon of water—six applications.
 12. Pyrethrum powder, 4 oz. per gallon of water—six applications.
 13. Proprietary emulsion (D), one part in 100 parts water—six applications.

Dusting Experiments-

14. 20 per cent. lead arsenate powder, with Kaolin dust, 1 part in 5-six dustings.

Checks-

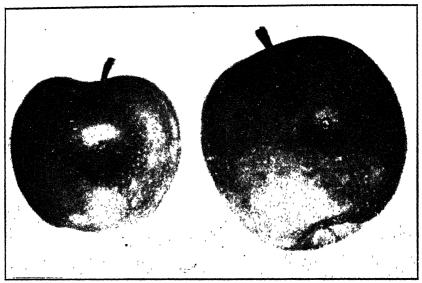
Unsprayed and undusted.
 Duplicate of No. 15, using Granny Smith apples.

The Jonathan apple was the main variety used for the purpose of these tests. Twelve trees of Granny Smith apples were also included, of which two were retained as unsprayed checks, the remainder being sprayed to afford a comparison of results on mid-season and late apples.

Hellebore, pyrethrum, and proprietary emulsion (D) were applied to two trees only, while the remaining plots each consisted of ten trees of Jonathan apples.

The normal spraying or dusting programme included one calyx and five cover applications. The cover applications were applied at intervals varying from eighteen to twenty-seven days, according to the activity of the moths as determined by field observations. In the case of the plot receiving four sprays only, the third and fifth cover applications of the normal programme were omitted.

In determining the efficiency of the separate treatments, the large variation in the number of fruit per plot makes it unwise to rely solely upon the percentage of infested fruit. Other possible factors, as the repellence of certain sprays and the ovicidal or egg-killing action of others, would tend to emphasise this point. An alternative method of estimating the larvicidal value of a spray is by comparing the number of larvae which enter the fruit with the number which produce minor injuries or "stings," their further activities being checked by the poison they have ingested.



Apples showing "Stings' produced by Codling Moth Larvae.

About two-thirds natural size.

Results of Dusting and Spraying Experiments.

The results of the various dusting and spraying experiments are set out in the following table:-

RESULTS of Dusting and Spraying Treatments.

	recoons of Dusting and Obraving Treatments.												
Treatment.*	No. of Fruit.	No. of Infested Fruit.	Per cent, Infested Fruit,	No. of Calyx Entries.	Per cent. Calyx Infesta- tion.	Per cent. Larvae entering Calyx.	No. of Stings.	Ratio of Stings to Entrances.	No. of Lurvac in Ban- dages.				
			J	onathar	Apples.								
1	9,556	4,319	45.20	316	3.31	7.18	1,192	0.27:1	1,326				
2	6,759	3,080	45.57	217	3.21	6.93	727	0.23:1	1,145				
3	6,881	3,052	44.35	139	2.02	4.46	803	0.26:1	1,192				
4 5 6 7 8 9	9,653	2,519	26.20	128	1.33	5.00	2,241	0.87:1	869				
5	8,183	712	8.70	97	1.19	13.49	759	1.06:1	277				
6	10,160	807	7.94	148	1.46	18-20	620	0.76:1	493				
7	4,685	2,232	47.64	236	5.04	10.43	340	0.15:1	653				
8	6,486	683	10.53	47	0.72	6.84	1,030	1.50:1	275				
	2,758	865.	31.41	189	6.85	21.75	56	0.06:1	579				
10	5,313	1,074	20.21	106	2.00	9.54	492	0.44:1	285				
11	1;453	964	66.35	162	11.15	16.28	<b>` 18</b>	0.02:1	333				
12	728	562	77.20	78	10.71	13.49	53	0.09:1	173				
13 14	322	186	57.76	21	6.52	11.11	13	0.07:1	51				
14	3,144	2,226	70.80	168	5.34	7.23	268	0.12:1	579				
1.2	4,676	3,860	82.55	859	18.37	20-60	102	0.02:1	1,507				
			Gr	anny Si	nith App	les.		•					
2'(A)		4,372	39.90	92	0.84	2.10	2,664	0.61:1	2,080				
15/A)	1,817	1,756	96.64	248	13.65	12-96	54	0.03:1	1,156				
	4 PM.							<del></del>					

<sup>\*</sup> The figures in this column refer to the list of treatments on page 835.

The various treatments listed in their order of merit according to-

- (a) Percentage of infested fruit, and
- (b) Ratio of stings to entrances,

are set out in the following tables:-

#### PERCENTAGE of Infested Fruit.

Trea	Percentage of infested fruit.					
6. Lead arsenate plus white oil (B)	•••	•••	•••	•••		7-94
5. Lead arsenate plus white oil (A)	•••	•••	•••	•••		8.70
8. Lead arsenate, 40 oz. in 50 gals. wat	er			•••		10.53
10. Lead arsenate plus miscible oil (C)		•••		•••		20.21
4. Lead arsenate, 20 oz. in 50 gals. wat	er	•••		•••		26.20
9. White oil (A) plus nicotine sulphate		•••	•••	•••		31.41
3. Lead arsenate, three sprays, followed				ee spra		44.35
1. Lead arsenate, 20 oz. in 50 gals., fou				***		45.20
2. Lead arsenate, four sprays, followed	by whi	te oil (	A), two	STOTA VE		45.57
7. Calcium arsenate		***		, - <u>p</u> j.		47.64
13. Proprietary emulsion (D)	•••	•••	•••	•••		57.76
11. Hellebore	•••	•••	•••		1	66.35
14. Dusting with lead arsenate powder	•••			•••	***	70.80
10 Demothers	•••	***	•••	•••	***	77·20
15. Check (unsprayed)	•••	•••	•••	•••		82.55

#### RATIO of Stings to Entrances.

Treatment.	Ratio of stings to entrances.	Percentage mortality.
3. Lead arsenate, 40 oz. in 50 gals, water	1.50:1	59.99
5. Lead arsenate, plus white oil (A)	1.06:1	51.35
4. Lead arsenate, 20 oz. in 50 gals water	0.87:1	46.66
6. Lead arsenate, plus white oil (B)	0.76:1	43.27
0. Lead arsenate, plus miscible oil (C)	0.44:1	30-69
l. Lead arsenate, 20 oz. in 50 gals water, four		
applications only	0.27:1	21.32
3. Lead arsenate, three sprays, followed by white		
oil (A), three sprays	0.26:1	20.49
2. Lead arsenate, four sprays, followed by white		
oil (A), two sprays	0.23:1	18-84
7. Calcium arsenate	0.15:1	13-07
4. Dusting with lead arsenate powder	0.12:1	10.34
2. Pyrethrum	0.09:1	8.40
3. Proprietary emulsion (D)	0.07:1	6-44
9. White oil (A), plus nicotine sulphate	0.06:1	6.05
5. Check (unsprayed)	0.02:1	2.39
1. Hellebore	0.02:1	1.78

#### General Conclusions Based on Field Experiments.

The evidence as to the relative efficiencies of the various treatments judged on the basis of percentage of infested fruit is in the main confirmed by the ratio of the stings to entrances, or percentage mortality of larvae causing injury to the fruit. It must be borne in mind that numbers of

larvae are poisoned without producing any visible injury, and also that a spray having any ovicidal value must receive due consideration for the number of grubs killed within the eggs without any possibility of injuring the fruit.

From the results it appears that:-

- (1) The combination of a white oil plus lead arsenate has given satisfactory control.
- (2) The use of double-strength lead arsenate has resulted in increased efficiency, and has also given satisfactory control.
- (3) Six sprayings of normal strength lead arsenate have resulted in a fair degree of control, but a lesser number of applications proved inadeauate.
- (4) The use of white oils alone, following three or four applications of lead arsenate, did not prove satisfactory.
  - (5) Calcium arsenate was markedly inferior to lead arsenate.
- (6) Six dustings with lead arsenate powder gave comparatively poor control.
- (7) Non-arsenicals, e.g., hellebore and pyrethrum, proved to be of very little value in control.
- (8) The combination of white oil and nicotine sulphate gave fair results, being mainly ovicidal in its action. The poor results judged on the basis of the "stings" is easily understood when this point is kept in view.

#### Spray Injuries and Deposits.

Fruit in many sprayed plots retained large deposits of lead arsenate and oil. The dusted trees were superior in this respect, being free from objectionable deposits. Samples of fruit have been analysed by the Chief Chemist, Department of Agriculture, and will be the subject of a report at a later date.

Spotting of the fruit occurred on trees sprayed with a proprietary emulsion, and also with a white oil plus nicotine sulphate. Pronounced russetting was prevalent on trees sprayed with lead arsenate plus a proprietary miscible oil.

Blotching of the fruit was common where the heavier deposits of lead arsenate were present, being mainly due to lack of colour of the fruit under the deposits. Wiping did not improve the appearance of the fruit noticeably.

Care should be taken not to put very muddy water in the spray vats when using oils, as a very objectionable deposit may result from this practice.

The fruit from the trees sprayed with white oil plus nicotine sulphate was very large in comparison with that from other plots, but this may have been mainly due to the light crop.

The use of oils in combination with lead arsenate had no apparent effect on the size of the fruit.

#### Bandaging.

Records of the number of larvae reaching the bandages on the experimental trees were kept throughout the season. Altogether 2,663 grubs were collected, representing 62.39 per cent. of the 4,268 grubs which had left the infested fruit. This percentage was undoubtedly higher than that obtaining in the main orchard, as the test trees had been specially treated and many of the crevices blocked up with grafting wax.

A number of bandages were treated with machine oil and various other chemicals, either alone or incorporated in the oil, in an attempt to kill the larvae without the present necessary periodical examinations, though it is realised that, in the case of old trees, larvae which happen to spin deep in



Tree with Bandage in Position, showing the need for Treatment to prevent Larvae sheltering away from the Bandage.

crevices will not be destroyed by even the most toxic bandages. Two proprietary machine oils were used and the results are indicated in the following table:—

Bandage treatment.	No. of larvae	No. of live	No. of dead
	in bandages.	larvae.	larvae,
Machine oil (A), plus boracic acid Boracic acid Machine oil (A) , (B) , (A), plus Beta naphthol Check (untreated)	57 34 56 16	4 51 5 3 2 81	18 6 29 53 14

Apparently the oil base is necessary for the killing of larvae, for boracic acid alone had no toxic effect upon the larvae. A considerable soakage of oil became apparent upon the bark of the trees, and this renders it necessary to watch the further reaction of the trees.

#### Dusting versus Spraying.

In addition to the plot of Jonathan apples previously referred to, it was arranged for a larger scale demonstration of the relative merits of dusting and spraying. This was carried out on Rome Beauty and Cleopatra



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apples, thirty trees of each variety being dusted and an equal number sprayed with lead arsenate. Both plots received one cally and five cover applications, each treatment being concluded on the same day. The dusting was carried out with a power machine, and each tree required 6 to 7 oz. of dust. Owing to faulty adjustment of the machine the cally dusting required an amount considerably in excess of this figure to ensure a thorough treatment. The dust consisted of a mixture containing 20 per cent. lead arsenate in finely divided kaolin.

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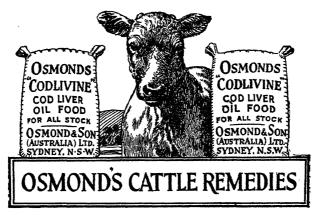


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The results of this exper	rimen	t were	as fo	llow:-			
Total number of fruit-						Dust.	Spray.
1. Cleopatra			•••	•••	•••	30,420	29,050
2. Rome Beauty	•••	•••	• • • •	•••	•••	27,518	28,633
Number of infested fruit-	-						
1. Cleopatra		•••	•••			18,825	4,660
2. Rome Beauty	•••	•••	•••	•••	•••	18,834	4,388
Percentage infestation				-			
1. Cleopatra						61.88	16.04
2. Rome Beauty	•••	•••	•••	•••	•••	68.44	15.32

The infestation in the dusted plots was approximately four times as severe as in the sprayed plots, and in addition 4,960 larvae were taken in the bandages of the sixty dusted trees compared with 1,546 larvae in an equal number of sprayed trees. These latter figures do not include those for the winter clean-up, which would further increase the margin in favour of the sprayed trees.

#### Laboratory Tests of Ovicides and Larvicides.

The following tests, though carried out in the season 1927-28, are recorded here because of the importance now attached to the use of white oil emulsions, and the effect of increasing the dosage of lead arsenate.

Ovicides.—Large supplies of freshly-deposited eggs were available during the course of the breeding experiments. Leaves bearing eggs were pinned to pieces of sheet cork to prevent any curling and injury to the eggs. The leaves were then sprayed, using a small atomiser, and placed aside to record the mortality. Three series of eggs were sprayed, the ovicides being applied to the respective series one, three, and six days after deposition. For the sake of brevity these have been combined into the following table:—

Treatment.	No. of eggs.	No. hatched.	No. dead.	Percentage of mortality.
White oil, 1 part in 60 parts water Red oil, 1 part in 40 parts water Lime-sulphur, 1 part in 33 parts water Nicotine sulphate, 1 part in 600 parts water Check (untreated)	 277 195 195 195 243	5 24 79 126 239	272 171 116 69 4	98-91 87-69 59-49 35-38 1-65

These figures clearly indicate that white oil emulsion forms a very efficient codling moth ovicide, and that lime-sulphur and nicotine sulphate both possess some cvicidal value. Miscible red oil is quite an efficient ovicide, but may be dangerous if used at the same concentration as in the experiment as a summer spray.

Larvicides.—Unsprayed apples, free from blemish, were selected and picked with as little handling as possible. These apples were suspended by means of a thread attached to the stalk and sprayed thoroughly with the various mixtures. After drying the apples were placed separately in small

jars, with a ring of tanglefoot placed about the upper rim to prevent any larvae from entering or leaving the jars. Ten freshly hatched larvae were then placed on each of the apples, which were allowed to remain undisturbed for ten days. The numbers of the effective entrances and stings were then recorded. Two series of larvicides were tested, and the results are given in the following tables:—

RESULTS of Larvicidal Tests	s (No.	1	Series).
-----------------------------	--------	---	----------

Treatment.	No. of larvae.	No. of entrances.	No. of stings.	Total injuries.	Ratio of stings to entrances.
White oil, 1 part in 60 parts water Red oil, 1 part in 40 parts water Lead arsenate, 20 oz. in 50 gals water Lead arsenate, 20 oz. in 50 gals.	200 200	71 106 35	10 9 44	81 115 79	0·14:1 0·08:1 1·26:1
water, plus casein-lime spreader - 10 oz. in 50 gals water - Check (unsprayed)	200 200	25 144	43 2	68 146	1·72:1 0·01:1

From this series of trials it is apparent that:-

- (1) Both white and red oil emulsions are poor larvicides.
- (2) Casein-lime spreader increases the efficiency of the lead arsenate.
- (3) The ratio of stings to entrances furnishes additional proof as to the larvicidal value of the sprays.
- (4) Complete control or complete infestation has not been obtained under laboratory conditions.

RESULTS of Larvicidal Tests (No. 2 Series).

Treatment.	No. of larvae.	No. of entrances.	No. of stings.	Total injuries.	Ratio of stings to entrances.
Lead arsenate, 20 oz. in 50 gals	100	21	15	36	0.71 ; 1
Lead arsenate, 40 oz. in 50 gals water Lead arsenate, 60 oz. in 50 gals	100	17	23	40	1.35:1
water Lead arsenate, 20 oz. in 50 gals	100	9	21	30	2.33:1
water, plus white oil 1 part in 100 parts water	100 100	19 77	21 0	40 77	1·11: 1 0·00:1

From this series it is apparent that:-

- (1) An increase in the concentration of lead arsenate decreases the number of effective entrances and increases the ratio of stings to entrances.
- (2) A combined spray of lead arsenate and white oil has a slightly increased efficiency, probably due to the spreading action of the white oil.
- (3) Even at a concentration of 60 oz. per 50 gallons of water, lead arsenate did not give a complete control of larvae in the laboratory.

#### Summary of Investigation.

Field Experiments.—Six sprayings of lead arsenate powder at the rate of 20 oz. in 50 gallons water showed 26.2 per cent. of infestation; four sprayings at the same strength showed 45.2 per cent. infestation. The control (untreated) trees showed an infestation of 82.5 per cent.

Double strength lead arsenate was much more efficient than the normal strength lead arsenate.

Calcium arsenate was inferior to lead arsenate in control.

Dusting with lead arsenate powder (20 per cent.) proved to be unsatisfactory in control compared with the lead arsenate sprays used.

Hellebore and pyrethrum exercised little or no control.

Combinations of white oil emulsions plus lead arsenate gave satisfactory control. A somewhat similar miscible oil gave less control.

A combination of white oil and nicotine sulphate showed some degree of control, showing 31.4 per cent. infestation.

White oil plus nicotine sulphate, lead arsenate plus miscible oil (C), and a proprietary emulsion (D) caused a certain amount of injury to the fruit.

Where for any reason an uneven spread of the lead arsenate occurred or heavy strengths were used, there was a tendency for the deposits to exclude the sunlight and cause uneven colouring. This irregular colouring gave a blotched appearance, and suggested the need for adequate spreaders.

Muddy water should not be used where white oil combinations are employed.

White oil did not cause any noticeable injury to the fruit or trees.

Bandaging Trials.—The percentage of larvae leaving the fruit and captured in the bandages was 62.39—this percentage can be increased by filling crevraes on the main limbs and trunks with grafting wax or some similar substance. These results indicate the value of bandaging as a general orchard practice.

Oil-soaked bandages procured considerable mortality among larvae cocooning therein or thereunder. Poracic acid alone did not destroy the larvae in or under the bandages.

Where crevices and irregularities of the trunks of old trees occurred beneath the bandages, many cocooning larvae escaped from the oil or chemicals employed.

The bark seemed to absorb considerable quantities of oil, so that some injurious reaction may follow.

Laboratory Tests of Ovicides and Larvicides.—White oil at a concentration of one part in sixty parts of water proved to be a very efficient ovicide.

A miscible red oil, one part in forty parts of water, was also effective, but at the strength used is not recommended as safe to apply as a summer spray.

Lime-sulphur and nicotine sulphate both possess appreciable ovicidal value.

Both white and red oil emulsions applied to the fruit are very poor larvicides.

Casein-lime spreader increases the efficiency of the lead arsenate.

An increase in the concentration of the lead arsenate increases the efficiency of the spray.

A combined spray of white oil and lead arsenate gave better larvicidal action than the lead arsenate alone, and in addition there is the undoubted ovicidal action of the white oil.

The number of stings compared with the number of effective entrances has provided evidence concerning the larvicidal value of the spray similar to that afforded by the actual number of infestations.

Even in laboratory tests neither complete control (i.e., 100 per cent. mortality of introduced grubs) nor 100 per cent. infestation of untreated fruits has been obtained.

# Selected Citrus Buds.

THE CO-OPERATIVE BUD SELECTION SOCIETY, LTD.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with the view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the ægis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best types of quality fruit and of reputed good bearing habits only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society, Ltd., supplied the following selected orange buds to nurserymen during the 1930 budding season, trees from which should be available for planting during the 1931 planting season:—

_				Buds of	Buds of
			Was	hington Navel.	Late Valencia.
	,	***		3,000	3,000
W. Beck, Epping		•••	•••	1,000	1,000
A. T. Eyles, Rydalmere		***		3,000	2,000
J. de Freitas, Fairfield		•••		200	200
R. Hughes, Ermington		***		1.000	1,000
L. P. Rosen and Son, Carlingfo	rd				
B. E. Yarnall, Ourimbah		•••	•••	100	100
A. T. Eyles, Rydalmere J. de Freitas, Fairfield R. Hughes, Ermington L. P. Bosen and Son, Carlingfo	ord	***	***	3,000 200 1,000 5,000	2,000 200 1,000 1,200

-C. G. SAVAGE, Director of Fruit Culture.

#### A FREE LEAFLET ON CODLING MOTH CONTROL.

A LEAFLET giving the very latest control recommendations, based on the results of the codling moth experiments carried out by the Department of Agriculture, can be had free on application to the Under Secretary, Box 36A, G.P.O., Sydney. This leaflet also contains the recently-revised regulations regarding codling moth control.

# Some Notes on Fruit Tree Stocks.

WITH SPECIAL REFERENCE TO DEPARTMENTAL INVESTIGATIONS.

C. G. SAVAGE, R.D.A., Director of Fruit Culture.

The question as to which stocks are most suitable for various fruits is one that has been exercising the minds of propagators probably from time immemorial, but the question has never caused so much discussion, nor has more research work been undertaken, than is the case at the present time.

The results of recent research work in many countries, especially at Long Ashton and East Malling, in England, have definitely shown that not only the vigour and growth but also the cropping propensities of the tree and the quality of the fruit may be influenced by the root-stock. Stocks may be used for a specific purpose, such as controlling disease or pest, bringing varieties into early fruiting, while at times the range of soils and climatic conditions over which certain trees may normally be grown can be extended by using stocks which will grow under conditions not conducive to satisfactory results with the stocks commonly used for such varieties.

#### The Question of Affinity.

While acknowledging the value of stocks in the control of pests, the fact that many of the physiological disorders may be due to lack of affinity or incompatibility between stock and scion must not be lost sight of. It is well known that certain stocks have a dwarfing influence upon the scion; specially is this true when the trees are worked some distance above the root system. Such stocks also have a tendency to cause the tree to crop at an earlier age. Experiments at Long Ashton have shown that the scion influences the root development of the tree when the union between root stock and scion is near the root system. The influence of the scion over the root system decreases the higher the union is up the stem.

In the past the practice has been for the great majority of the apple trees to be worked upon Northern Spy stocks, as this variety is immune to woolly aphis, is easily propagated, and roots readily. Investigations show that there are strains of the Northern Spy, but in the past no regard has been paid to them, nor has any great attention been given to the vigour of the tree from which stocks have been propagated. The question of suitability of the Spy stock for various types of soils and varying climatic conditions, or compatibility between scions of commercial varieties, has never been seriously considered.

The seedling stock to-day has many advocates who claim that larger trees and heavier crops may be produced by working the desired variety on free seedlings. Investigators claim that many of the physiological disorders occurring in fruits are probably due to incompatibility or lack of affinity between scion and root-stock.

In passing, reference might be made to some of the physiological troubles that might be due to lack of affinity between stock and scion and to which special attention is being paid. They are internal breakdown or cork of apples, black end of pears, and scald or internal breakdown of plums. To determine whether this is the case or not special investigations have already been commenced.

#### Method of Propagation an Important Factor.

Methods of propagation also may have a decided influence upon the longevity as well as upon the cropping habits of the trees.

The foregoing remarks, though applied more or less to the apple, are equally applicable to other sorts of fruits, and, realising the necessity for investigations into propagation methods and stock problems, the Fruit Branch of the Department of Agriculture has undertaken this work on a comprehensive scale. The trees under investigation are the apple, pear, peach, apricot, prune, cherry, and citrus. To enable the work of the Branch to be conducted satisfactorily special investigational work has been planned for carrying out at the Departments institutions at Bathurst, Glen Innes, Richmond, Narara, Grafton, Wagga, and Yanco. In order to gain knowledge of the behaviour of the specially selected and worked trees over a wide range of both soil and climatic conditions, series of the trees are being planted in private orchards in many districts, the growers being willing to carry out the tests in order to assist the Department and the fruit industry. May I here state that departmental officers have greatly appreciated the ready manner in which leading growers have willingly offered to assist in the work.

#### Investigations with Stocks.

The stock investigations will be carried out at the Departments institutions as follows:—

Bathurst Experiment Farm.—At this station 24 acres have been set apart for special work with cherry, peach, and pome fruit trees.

New England Experiment Farm, Glen Innes.—The work is being mainly confined to the physiological defects of apples.

Narara Viticultural Nursery.—The stock work is being carried out with citrus trees.

Hawkesbury Agricultural College.—Citrus and stone fruit tree stocks are being tested.

Grafton Experiment Farm.—The stock investigations are being confined to citrus trees.

Wagga Experiment Farm.—The prune stock problem is being undertaken at this farm, as well as a few trials with other stone fruits. Physiological disorders of plums will also be undertaken.

Yanco Rice Research Station.—The stock work at this station will be carried out with citrus trees.

#### Other Investigations.

The following investigations have been planned:-

#### APPLES.

- (a) Selected strains of Northern Spy are being propagated vegetatively. Two strains have been located, one of which produces red and the other striped apples. The required number of stocks are being propagated as clonal strains.
- (b) Free seedlings of crab apples are being raised from introduced seeds.
- (c) Special strains of apple stocks raised at East Malling Station are being introduced.
- (d) Free seedlings are being raised from many of the commercial varieties, as well as from seeds artificially cross-fertilised. In the first case it is thought that union between scion and seedling of the same variety should be compatible. In the second case varieties have been crossed which possess some distinct advantage as a stock. In this connection the Plant Breeding Branch is assisting by carrying out the desired cross-fertilisation work.
- (e) Methods of propagating:—(1) By layers and cuttings, (2) by grafting on Northern Spy root, and (3) by grafting about 6 inches above the soil level. The layer and cutting method is to be tested out, as some growers claim that trees are stronger, longer lived, and bear heavier crops when grown upon their own roots than when worked on other stock. Scions of the desired variety are being root-grafted and planted so that the union is at ground level and also deeply buried. In the first case the tree will depend solely upon the Spy root, in the second case the scion will root and the tree will be drawing the sap supply both by means of the Spy and its own roots. The trees worked 6 inches above soil level will serve as checks or controls, and represent the usual nursery method of propagation. The influence of scion over root-stock and root-stock over scion will be noted.

#### PEARS.

- (a) Selected strains of *Pyrus communis* (the common pear stick that is used almost exclusively) are being propagated vegetatively. The need for work in this direction will be readily realised by the examination in the nursery row of the seedling stocks, where wide variations in growth will be noticed, while in the orchard the suckering habit and irregular growth of the trees will be seen.
- (b) Seedlings have been raised of Pyrus calleryana and P. pashia, and it is hoped to obtain seedlings of P. ussurensis. The Seedlings of P. calleryana show great dissimilarity in growth. Selections are being made from which supplies of stock are being raised vegetatively. P. pashia, from the appearance in the nursery row, appear to come true from seed. Stocks are also being raised by vegetative means.

- (c) Stocks are being raised from naturally fertilised as well as from artificially crossed seeds, as in the case of the apple.
- (d) Methods of propagating:—(1) By layers and cuttings, and (2) by grafting above soil level.

#### PEACHES.

- (a) Clonal strains of vigorous stocks are to be investigated.
- (b) Seedlings are being raised from specific varieties which will beworked with scions of the same variety as the stock.
- (c) Apricot and peach stocks are being tested out side by side in the drier, non-irrigated areas.

#### APRICOTS.

Little work has been planned for this fruit at present, the main work in hand being the working of varieties on peach and apricot seedling stock.

#### PRUNES.

- (a) Strains of Myrobolan and Marianna have been located and are being raised by vegetative means.
- (b) Seeds of several species have been introduced from which seedlings are being raised.
- (c) Vegetatively raised stocks are being propagated from several types, other than Myrobolan and Marianna, that are claimed to be satisfactory.
  - (d) Methods of propagation are also being investigated.

#### CHERRIES.

- (a) Selected strains of Mahaleb, Mazzard, and Kentish are being raised. The Kentish stock appears to give satisfaction over a very wide area and has the advantage of bringing trees into early fruiting. The suckering habit is a big disadvantage. An attempt is being made to locate a Kentish strain having the desirable characteristics without the disadvantage of the suckering habit.
- (b) Intermediate stem stocks are also being tested out, with a view of combining the desirable characteristics of two types of stocks and climinating the undesirable characteristics.

#### CITRUS.

- (a) Seedlings have been raised from the sweet and sour orange, citronelle, lemon, trifoliata, sweet lime, grapefruit, and Cleopatra mandarin.
- (b) Stocks are being raised by vegetative means from cuttings. From experiments already conducted with the common lemon stock, it is found that a large percentage of both soft and hard-wood cuttings can be easily struck in an ordinary propagating frame. It appears that twelve months can be saved in raising nursery stock by this method. Whether the stock raised from cuttings will prove of equal or greater value in the orchard than the seedling has yet to be demonstrated.

- (c) The native citrus species are not being neglected, as it is felt that by their use the area over which citrus may be grown can be extended. In this connection, seedlings of *Microcitrus australis*, *Microcitrus australusica*, *Eremocitrus glauca*, and *Microcitrus inodera* have been raised.
- (d) Seeds of other species such as Citrus excelsa and C. acida, and plants of citrus hybrids have been and are being introduced.
  - (e) Layers and cuttings.

#### General Remarks.

The work of raising the trees is being carried out at the Viticultural Nursery, Narara, and records are being kept of the many ways in which the stocks are raised. The methods of vegetative propagation used comprise root and top cuttings, stooling, layering, and root grafting.

Tests have also been initiated to find the best methods for raising seedlings. With pome fruits the germination is greatly increased if the seed is cold stored for several weeks. Stone fruit pips are also being cold stored and the germinating percentages noted.

The behaviour of the various types of stocks under varying climatic and soil conditions will be carefully noted. Such characteristics as vigour, cropping propensities, resistance to fungus diseases and insect pests, and rooting habits will receive special attention.

Having proved that a certain type of seedling stock is giving outstanding results, further supplies of the type will be propagated vegetatively, probably by means of root cuttings. Where possible specimen trees of all the vegetatively-raised stock are being planted at the nursery in order to have a "mother" tree from which propagating material might be obtained when a type proves worthy of perpetuating.

The "stock" question opens up a vast field for investigation, the limiting factors being the area which can be placed under experiments and the staff available to carry out the work. To test out thoroughly the question of affinity of stock and scion it would be necessary to take the whole of the commercial varieties and work them on the different stocks, but as this would make the work too unwieldy the investigations have had to be limited to a few of the leading varieties. Definite results cannot be expected for some years, after which time, in the case of vegetatively-raised stock, some further time must elapse before any particular stock will be available on a large commercial scale.

#### THE BEST METHOD OF PROPAGATING SWEET POTATOES.

For a number of years now the Department of Agriculture has advocated the use of rooted plants from tubers as being the best method of propagating sweet potatoes. The soundness of this advice was demonstrated by Mr. H. A. Grantham, Experimentalist, at Bathurst Experiment Farm last season. In a carefully conducted propagation experiment, rooted plants from tubers gave an average yield of 9 tons 14 cwt. per acre as against a yield of 8 tons 1 cwt. obtained from an area planted with cuttings from that same season's growth.

#### EFFECT OF CROSS-POLLINATION ON COLOUR IN POME FRUITS.

A WIDESPREAD interest in the influence on colour of inter-pollination among varieties of apples and pears is shown by discussions that occur from time to time. The opinion of horticultural authorities in general, based on known botanical and physiological grounds, is against the likelihood of such cross pollination and fertilisation immediately affecting the colour of skin and flesh; a few who hold the opposite opinion offer no evidence in support.

Apples and pears are, botanically, "false fruits," the bulk of the edible portion being formed by enlargement of a secondary part of the flower, the calyx cup. The true fruit (the "core," as in other fruits) is a result of the development of the fertilised ovary and its appendages, but in this case it is completely surrounded by the enlarged calyx cup, which is not directly affected by fertilisation, though it is usually stimulated to growth. Many growers must be aware, however, that the calyx cup often develops into an apparently normal fruit which may reach maturity, without fertilisation having occurred. Such fruit is termed parthenocarpic and is, of course, seedless.

A need for systematic investigation was shown by the persistence of a belief among growers that, especially in apples, varieties which are naturally poorly coloured can be improved to some extent in this respect through pollination by well-coloured varieties, and *vice versa*. It seems safe to say that they have been misled by too casual observation, and possibly by the effect of phenomena other than pollination.

Opportunity was taken to test the point accurately in the course of cross-breeding work and pollination studies with pome fruits being carried out by plant breeders at Bathurst, Glen Innes, and Yanco. Several hundred artificial cross-fertilisations have been effected in apples and pears at these experiment farms during the past two or three years, and the resulting fruits have been closely compared with self-fertilised fruits on the same trees and with one another, in colour as well as shape. No grower could have the same opportunity of studying the effect of cross-fertilisation unless he systematically undertook the investigation in the same way.

Granny Smith apple has been artificially crossed with Commerce, Delicious, Irish Peach, Jonathan, King David. Tasma, and Yates—the latter all well-coloured varieties—and not one of these crossbred fruits showed any variation in colour from that of the normally fertilised or self-fertilised female parent; nor was any colour difference observed in the reciprocal

crosses, or in crosses between the coloured varieties themselves.

Similar observations have been made with pears.

The conclusion has been reached that cross pollination has no effect whatever on the immediate colour in pome fruits.—W. Poggendorff, Assistant Plant Breeder.

## "THE PIG BREEDERS' ANNUAL, 1930-31."

The Pig-breeders' Annual is an excellent compilation, published by the National Pig-breeders' Association, London. Its many articles on breeding, feeding and miscellaneous topics should prove equally as interesting to the Australian as to the English pig-breeder.

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W.C.I.

# Sodium Chlorate not Recommended as a Weedicide in Banana Plantations.

H. W. EASTWOOD, H.D.A., Fruit Instructor.

EVERY banana grower has experienced the difficulties of keeping weed growth under control during the months of heavy and regular rainfall, such as were experienced from January to June of this year. Under these conditions weeds flourish, and if some means are not taken to suppress them they eventually seed.

The usual methods of chipping and hand pulling, or the use of horse implements where they can be worked, are out of the question in periods of sustained wet weather. Brushing is done by many growers as an emergency control, and spraying with arsenical mixtures is resorted to by others. This latter method would appear to be the only possible way of keeping a plantation free of weeds under the circumstances.

Although good results are achieved by spraying with arsenite of soda or arsenic pentoxide, the handling of poisons such as these is to be avoided if possible, for obvious reasons. When it became known that sodium chlorate had given excellent results in experiments carried out in other parts of the State in destroying weed growth and grass, it was considered that it would be a useful weedicide for use in banana plantations. Beliefs were entertained that it would replace the arsenical sprays generally used, as it is non-poisonous, readily soluble in water, thus taking less time to prepare, less risky to use, and non-injurious to the soil.

A few banana growers decided to give this salt a trial. They sprayed small patches in their plantations, and were surprised to find that it not only killed the weeds but also affected the banana plants nearby. Further trials by other growers gave similar results. Mixtures of  $\frac{3}{4}$  lb., 1 lb., and  $\frac{1}{2}$  lb. sodium chlorate to 1 gallon of water were sprayed on the weeds to within about 1 foot radius of the stools, and particular care was exercised to prevent any of the mixture coming in direct contact with the banana plants. The weeds around the stools were unaffected, which is sufficient evidence that the spray did not touch the banana plants.

The effects of the sprayings were noticeable three and four weeks after the applications. The leaves of the banana plants became dotted with small black pitted and sunken spots. These spots appeared on the leaf blades and along the midribs, and later developed a purplish-black colour. Subsequently the affected leaves turned yellow, became like brown paper, and finally died, although new leaves produced after the applications of spray were unaffected and grew naturally.

The plants naturally received a check, but this was only a temporary setback, for at a later date it was difficult to detect the affected stools in the plantation. More serious damage might have resulted but for the fact that this salt is easily washed out of the soil by rain. The fact that over a month elapsed after spraying before any damage to the banana plants became apparent can be accounted for by the sodium chlorate taking that length of time to penetrate the soil to the region of the roots.

In view of the foregoing, sodium chlorate cannot be recommended to banana growers as a suitable weedicide. Arsenic pentoxide is now being used for this purpose, and it is just as efficacious as the commonly used arsenite of soda. As the former is more easily dissolved in water, time and labour are saved in preparing this spray, which makes it worthy of a trial. It is put up in various sized tins, on which are printed directions for its use.

#### MAIZE EXPERIMENTS ON THE SOUTH COAST.

In the grain variety trial carried out by Mr. H. O. Cox, Barrengarry, Kangaroo Valley, a variety (Cox's Yellow) which he has been growing for some years came out on top with a yield of 117 bushels per acre. This variety, although a good yielder, is showing much variation in type. Pride of Hawkesbury made a very good showing with a yield of 116 bushels, and it is considered that further trials will demonstrate that this variety is the most suitable for grain in this district. Fitzroy, well known among the Valley farmers, both as a grain and green fodder variety, yielded 115 bushels, while Boone County White, with a yield of 106 bushels per acre, upheld its previous good reputation. The yields of the other varieties are:

—Yellow Hogan 113 bushels, Hickory King 99 bushels, Funk's Yellow Dent 99 bushels, Silvermine 81 bushels, Golden Superb 71 bushels, Leaming 69 bushels. All plots in the variety trial received a dressing of superphosphate at the rate of 2 cwt. per acre.

Maize grain manurial trials were carried out on the farms of Messrs. A. Chittick, Kangaroo Valley, and C. T. Hindmarsh, Gerringong. The variety used at Kangaroo Valley was Boone County White, and at Gerringong Funk's Yellow Dent. The results of these trials, after taking into account the costs of the different fertilisers used, point to superphosphate being the most satisfactory fertiliser. This confirms the results obtained in previous years. The yields were as follows:—

Fertiliser.	H. Chittick, Kangaroo Valley.	C. T. Hindmarsh, Gerringong.
Superphosphate (140 lb. per acre)  Basic superphosphate (176 lb. per acre)  M22 mixture* (140 lb. per acre)  No manure	99 36 93 12	bus. 1b. 77 8 74 0 64 16 75 0

<sup>\*</sup> M22 fertiliser mixture consists o equal parts of superphosphate and bonedust

Trials to ascertain the best fertiliser for green fodder maize were carried out in a number of centres, but owing to the unfavourable weather conditions, the results were unsatisfactory.—R. N. Makin, Senior Agricultural Instructor.



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# Citrus-growing Problems.

THE INFLUENCE OF BUD SELECTION.

R. J. BENTON, Special Fruit Instructor.\*

The difficulty of obtaining profitable returns for production during recent years has caused every citrus grower some concern. The facts of the position must be faced, and consideration given to the question—What are the prospects for the industry in New South Wales? Despite more or less successful attempts during the last five years to organise growers, it is well known that in the years 1925 and 1928 much of the produce was never marketed, and again this season very heavy losses are being sustained. In the years 1925 and 1928 the production was above normal, but this season the crop is not more than an average crop on the whole, and the accumulated amount of fruit unsold can be definitely ascribed to the reduced purchasing power of the people.

The area under citrus fruit in this State is about 31,000 acres—comprising 6,500 acres of Navels, 8,800 acres of Valencias, 7,000 acres of mandarins, 5,000 acres of common oranges, 2,700 acres of lemons, and 1,000 acres of assorted other varieties. The area has not increased for a few years, though the production will possibly increase slightly, due to trees maturing.

For many years this State produced about two-thirds of the whole Australian production and looked to the other Australian States and to New Zealand for a profitable outlet. But other States, notably Victoria and South Australia, have increased their areas of citrus until now they can usually supply their own needs and in addition export a quota. Growers in New South Wales are consequently experiencing keener competition, which will increase, for the long distances from other markets render oversea shipments more or less hazardous. It is imperative, therefore, that our production be placed on an economical basis and that every local avenue of distribution be exploited.

The soil on portion of the area under citrus in this State is such that production can never be profitable. The costs of production and marketing from many trees in some localities amount, at present rates, to from 8s. to 10s. per bushel, while in other districts the figure is 4s. per bushel. Obviously these "high cost of production" trees must eventually be grubbed out. Under present conditions it is necessary that the maximum quantity of the quality of fruit desired by the market shall be produced on the minimum number of trees, or, in other words, every tree must earn its share.

To know definitely whether this is the case, and as a guide to productivity, an indicator record is recommended. In every orchard will be

<sup>\*</sup> Paper read at the annual Conference of the Fruit and Vegetable Grower s'Group of the Agricultural Bureau, held at Richmond, 1930.

found one or two, perhaps many, trees which are not up to the standard of the others. Their ailment may be seasonal only-perhaps due to pests or environment-or may be due to hereditary influences. By keeping a record over a number of years any doubt could be eliminated and a definite remedy suggested. Four years' recording of every tree's performance is recommended as being sufficiently long to guide one as to the There are many causes of variation in quality and tree's character. quantity of fruit produced, but it is desired to stress that a high standard of quality is closely related to the tree's parentage. Climatic and soil conditions greatly affect the quality of fruit produced, but in addition it is essential that the tree must be of a good strain. If the strain is a poor one, the quality of the fruit will naturally be poor. Inferior types or strains have been recorded in many citrus orchards and in most varieties. Navel oranges are believed by some to be the only variety susceptible to variation, but every citrus variety as yet inspected has indicated an apparent degeneracy. Lemons and Emperor mandarins as well as White Siletta Navel oranges and Valencias have shown peculiarities which should be avoided.

Sometimes these peculiarities are apparent only in individual fruitstwig variations—and at other times whole limbs and even whole trees are concerned. Where individual fruits only are concerned, the variation is not found annually, for the twigs do not fruit annually, but where whole limb variations are concerned no trouble should be experienced in finding the "off" type each year, and they may be overcome by cutting off the affected portion. Where the whole tree is affected it is necessary to rework the tree to a proved good quality strain. The parent tree to provide the buds for re-working might be obtained from the best tree-indicated by its record. A suitable tree to provide buds must have produced fruit typical of the variety and containing a minimum amount of rag and plenty of juice. If trees need to be replaced, only trees worked from guaranteed buds (taken from proved parent trees and from small fruitwood—not sucker type) should be obtained. The most prevalent form of variation is probably whole trees of apparently distinct type. An occasional type—so named Australian-distinguished by its gross habit of growth is a case in point. "Off" type fruits may differ from normal not only in external appearance, but in internal qualities, which are usually very inferior; there is commonly a lack of juice and an increased amount of rag or fibre. Such fruits are to be found among Navels, Valencias, and others. This producing of "off" types is commonly called "sporting," meaning a departure from normal, and its occurrence demonstrates the necessity for the greatest care in the selection of bud wood for citrus propagation. What may be , called the "typical fixed types" of the varieties do not usually exhibit this tendency to sport, though some of our best-known varieties are the result selections from sports found on some of the original types. Washington Navel variety originated in this way, but owing to the fact that propagators have not paid proper attention to preserving this type, degeneracy has taken place, with the result that we have many types that are lacking in colour, juice and conformation. Emperor mandarin is another variety which undoubtedly is declining in several respects, and Valencia Late orange and lemon varieties, particularly Eureka, or Sweet-rind as it is more commonly known, also show much evidence of deterioration at times. How far the tendency to produce off types is inherited can only be ascertained by propagating from trees which show this habit of producing undesirable types, and waiting until the progeny trees are in bearing. A strain of a variety that consistently shows a high percentage of undesirable types in different localities should not be perpetuated.

For many years our best and oldest citrus growers recognised the necessity of going only to their best trees for bud wood. Their wisdom is reflected in their orchards (old and young) to-day. Nurserymen, on the other hand, have been must less discreet, often selecting budding wood from the most convenient source, disregarding any other factors. The result has been the planting of many inferior strains, some of which are most objectionable.

To guard against this possibility the Bud Selection Co-operative Society has been formed and has completed two years' operations. This company, which is controlled by fruit-growers' respresentatives, actually cuts buds from selected trees and sells them to nurserymen. Greater uniformity and a higher standard must result from growing trees from these selected buds. Naturally the trees thus raised must cost a little more, but the additional expense of about 3d. per tree should be warranted by even the first year's production. It is disappointing to know that the Society's activities have not been more widely appreciated as yet, for many trees worked with the nurserymen's selection of buds are still being planted. Growers appear to prefer "cheap" trees to quality trees costing only about 3d. per tree more.

In recent years growers in New South Wales have mainly concentrated on the planting of Washington Navels and Valencia Late oranges with Emperor mandarins and Eureka (Sweet-rind) lemons. Minor recent plantings and many old groves are largely of common orange varieties. In a very limited number of locations only are the latter to be recommended—only where there are soils suitable for producing quantities of superior quality common varieties. In most situations common oranges are too thick-skinned and seedy or small in size and quantity to be profitable. Under these circumstances they should be re-worked or grubbed out.

A multiplicity of varieties is very undesirable and renders organisation of marketing difficult. The more or less precarious position of the industry in New South Wales is largely due to this cause. In this respect we resemble Florida, but are in striking contrast to California. In the latter State, production is almost solely confined to Navels, Valencias, lemons and Marsh grapefruit. Districts really specialise in production of limited varieties. Such a limitation of varieties renders marketing organisation much easier and is no doubt a reason why 90 per cent. of the production is marketed in an organised manner. Florida, on the other hand, with its endless varieties, has been very much handicapped by being only about

30 per cent. organised. The Florida fruit is acknowledged to be the more juicy and palatable, yet the Californian product is more attractive in appearance and returns more to its producer.

Methods of distribution of fruit have not kept pace with the advances made in production, hence there is a greater tendency for the market to be choked or glutted. What have those salesmen responsible for disposal of growers' fruit done to meet the situation? It is unfortunately every grower's experience to have his products sacrificed to a greater or less extent. Most other industries and salesman devote much energy and publicity to unloading unduly heavy stocks. A greatly increased turnover is invited by reducing profits on the product. Increased travellers are employed to get rid of accumulated stock. Growers ask themselves (through their organisations) to agree to a case levy to be used for advertisng their product—but the agents are not conspicuous in leading a move. They do not lead in this manner partly because their numbers are unwieldly. Just as many varieties are more or less an encumbrance to economical production by growers, so too many salesmen of fruit in the one location are a danger to themselves and result in stinted effort on their part.

Citrus growers' organisations in Victoria, New South Wales, Florida and California have all experienced success with a limitation of agents. Not for a minute, however, is it believed that such middlemen, as some may term them, can be done without; they are undoubtedly necessary. Their experience is of the greatest value to growers and retailers, but to ensure growers a reasonable return for their investment agents should be helped to guard against themselves. This can only be done by strictly and greatly reducing their numbers, till reasonable conditions rule between the grower and the consumer. They would then, after collaborating with growers, have confidence in conducting a vigorous sales policy during periods of heavy production in particular, and generally stimulating sales of regular production.

Briefly summarised, the points of interest in the present situation are:-

- 1. That with the amount of citrus fruit now being produced, and with reduced interstate outlet, the best quality fruit only must be marketed.
  - 2. That varieties of citrus fruits should be limited as much as possible.
- 3. That a tree performance record should be kept for four years to indicate definitely what each tree is earning.
- 4. That any inferior strains or unprofitable varieties should be re-worked or re-planted.
- 5. That growers should insist on nurserymen supplying trees propagated from buds supplied by the Bud Selection Co-operative Society.
- 6. That any new plantings should only be on soil capable of heavy and economical production.
- 7. That our export markets are restricted, rendering it essential that quality fruit be produced and the local markets utilised to the utmost.

- 8. That such utilisation is rendered difficult by our present methods of distribution.
- 9. That our methods of distribution have not kept pace with the advances made in production.
- 10. That environment and multiplicity of varieties and qualities make it difficult to organise the growers.
- 11. That it would be more effective to organise the wholesale agents than the producers.
- 12. That a considerable limitation in the number of wholesale agents selling fruit is necessary for the more efficient handling of production.

#### THE SUMMER SCHOOL IN APICULTURE.

THE regular school of instruction for bee-keepers will be held at Hawkesbury Agricultural College, Richmond, from 6th to 21st January, 1931. The school is open to both sexes over 16 years of age, the fee for the course, including board and lodging, &c., being £3 10s., payable to the Under Secretary, Department of Agriculture, Box 36a, G.P.O., Sydney, to whom application for enrolment must be forwarded not later than 18th December, 1930. Write to the Department, or to the Principal, Hawkesbury Agricultural College, Richmond, for a copy of the prospectus giving full details of the course.

## To Combat Tetanus, Malignant Oedema, and Caseous Lymphadenitis.

RESEARCH has shown that these three diseases are due to particular organisms infecting wounds on sheep. Field observation has indicated that the shearing shed and its surroundings are the main sources of infection. methods necessary to combat the presence of these organisms may be summed up in the word "cleanliness." Where the necessary measures to improve cleanliness have been undertaken they have not infrequently resulted in a remarkable diminution of mortality. This question of cleanliness should cover the shearing sheds, yards, and the whole surroundings of the place. The particular points to which attention should be given will vary in each instance, and any member of the veterinary or inspectorial staff is at the disposal of the stockowner who wishes to prevent such mortality. But the application of cleanliness means work, and there is nothing spectacular about it. Probably the necessary measures have been neglected because they appeared so ordinary and made very little appeal to the imagination, but that does not necessarily mean that they will not be of considerable value. The expense involved in putting them into operation cannot be great, and any stockowner who has had losses from tetanus following shearing should seriously review the situation of the conditions under which his sheep were shorn. Naturally, of course, the less the sheep are cut about the less will they be liable to contract any of these infections. There can he no question that by the more general adoption of good hygiene a considerable saving of economic loss would be effected.—MAX HENRY, Chief Veterinary Surgeon.

### Orchard Notes.

NOVEMBER.

C G. SAVAGE and H. BROADFOOT.

#### Pests and Diseases.

Codling Moth.—The following new regulations recently proclaimed under the Plant Diseases Act make it compulsory for growers to carry out the following measures in regard to codling moth control:—

- 1. Thoroughly spray all apple, pear and quince trees and suckers four times every year with arsenate of lead in the proportion of not less than 24 ounces of dry arsenate of lead powder or 48 ounces of arsenate of lead paste to 50 gallons of water, at the following times, viz.:—The first spraying to be commenced when the majority of the petals have fallen and to be completed by the 30th October, the second spraying to be commenced three weeks from the commencement of the first spraying and to be completed by the 20th November, the third spraying to be commenced three weeks from the commencement of the second spraying and to be completed by the 11th December, and the fourth spraying to be commenced four weeks from the commencement of the third spraying and to be completed by the 8th January.
- 2. Keep all apple, pear and quince trees free from loose bark and broken limbs, and keep all crevices or cavities in such trees free from the larvae and pupae of *Cydia pomonella* (codling moth), and destroy by burning all such larvae, pupae, and litter arising from the removal of the loose bark and broken limbs and from the cleaning of the crevices and cavities.
- 3. Collect and remove from the orchard all fallen apples, pears and quinces at intervals not exceeding seven days.
- 4. Destroy all infected apples, pears and quinces at intervals not exceeding seven days by boiling for ten minutes, or by burning or by placing in a pit suitably covered.

Growers will notice that bandaging is no longer compulsory, but they should bear in mind that their responsibility as far as codling moth control is concerned does not end with merely carrying out the compulsory measures, but in maintaining their orchard reasonably free of this pest, and it is hoped that in districts where the prescribed methods alone are insufficient to control the pest, orchardists will continue to bandage in order to kill the hiding grubs. Apple and pear growers would also be wise to watch for the time when the first generation from the carry-over grubs start to enter the fruit fairly freely and to pick off and destroy the infested fruit, the object being to reduce the first generation to a minimum and thereby appreciably check the increase due to breeding.

Attention is drawn to a new leaflet on the control of codling moth just published by the Department of Agriculture. The information is based chiefly on the results of experiments and investigations carried out continuously during the past few years both in laboratory and in the field by the Entomological Branch. In it will be found strong arguments for bandaging as a means of combating the codling moth, and it also points out how the efficiency of the bandage diminishes when other hiding places, such as loose bark, &c., are allowed to remain on the limbs of the trees.

These departmental experiments have further demonstrated that the addition of miscible white oils to the lead arsenate spray considerably increases its efficiency, but the trials will need to be continued for a greater number of years before it can be definitely stated whether or not the frequent use of summer spray oils will have an injurious effect upon the trees. Growers are also cautioned as to the possible danger of using the summer oil sprays and sprays of sulphur compounds on the trees too soon after one another. Experiments are being conducted to determine what damage results and what interval of time must elapse between applications of these two classes of sprays. The leaflet in question also points out that, while increasing the number of applications or strength of arsenate sprays has the advantage of giving better control of the later generation of codling moth, it has a drawback in that it increases the quantity of arsenical residue on the fruit, perhaps making it necessary to wipe or wash the fruit after harvesting.

Write to the Department for a copy of this leaflet ("Codling Moth Control") and at the same time ask for the leaflet, "Disposal of Waste Fruit," which gives details of the construction of an insect-proof covered pit designed by the Entomological Branch for the quick disposal of waste fruit. Such a pit will be found of great convenience on any orchard during the busy fruit season, especially so where firewood for boiling or burning the infested fruit is scarce.

Other Pests and Diseases.—Black spot of apple and pear, black spot and downy mildew of grape vines, woolly aphis, black peach aphis, and apple-leaf jassid were dealt with in these Notes for August and October.

#### Cultivation.

From time to time attention has been drawn in these *Notes* to the importance of thorough cultivation, the subject being referred to as recently as October last. Mr. W. W. Cooke, Fruit Instructor, Goulburn, gives weight to our off-repeated remarks on this matter by quoting specific-cases where cultivation was the chief deciding factor between success and failure. He writes:—

"The summer of 1929-30 was a very dry one in most parts of southern New South Wales, and as it followed a dry winter (the 1928-29 summer was also fairly dry) the subsoil of many orchards did not receive a thorough soaking for over eighteen months. The effect of this prolonged period of dry weather was very noticeable in some orchards, whilst in others it was far less apparent. Instances occurred where orchards situated in

close proximity, and of similar soil, aspect, and contour of land, showed a marked difference in the quantity and quality of the fruit produced, as well as in the health and vigour of the trees. In several parts of my district this contrast was so great that it appears worthy of special mention.

"In one instance there were two orchards of about the same age and size and planted with similar varieties. The owner of one had decided to grub out most of his trees, as they were not paying, owing to irregular cropping and the poor quality of the fruit produced; also many trees were dying. His neighbour, however, proposed extending his orchard, planting the varieties that had failed in the neighbouring orchard, but which with him had been most successful. As the soil, aspect, &c., were identical in each orchard and as each had received the same amount of rain, the treatment the soil and trees had received must have been the factor determining success or failure. Whilst better pruning and spraying had no doubt helped, the principal factor was the cultivation of the soil.

"The difference in treatment in this regard was most marked. The successful orchard received at least one—usually two—ploughings each year, whilst suitable cultivation between October and March prevented the growth of weeds and insured a good soil mulch. The non-paying orchard, on the other hand, received not more than one ploughing a year and was not cultivated. At first this neglect did not produce the disastrous results that followed later on, the rainfall that year being above normal, but with the rainfall of the following years below the average, the difference between the two orchards was so great as to warrant recording. Similar instances in other districts could be mentioned.

"The correct methods of cultivation have been so often described that I do not propose to mention them, but as there is a tendency with some growers to neglect cultivation, whilst odd ones have expressed the desire to test the effect of a 'sod' orchard, I feel that a word of warning might not be out of place. The harmful effects of such treatment have been brought forcibly under my notice during the last twelve months. Whilst a 'sod' orchard may give payable results in some countries, the comparatively hot sun and dry climate of New South Wales render it most unsuitable for most parts, if not all, of this State. So far, I have not seen one profitable orchard where the owner has neglected to cultivate."

## SWEET POTATO VARIETIES AT WOLLONGBAR EXPERIMENT FARM.

The yields in the variety trial carried out last season at Wollongbar Experiment Farm, Lismore, gave further proof as to the suitability of Brookes' Seedling and Yellow Strasburg varieties for that district, both for human consumption and stock feed. The varieties under trial and their yields were as follows:—Brookes' Seedling, 6 tons 2 cwt. 3 qr. 2 lb.; Yellow Strasburg, 4 tons 14 cwt. 3 qr. 3 lb.; Nancy Hall, 4 tons 12 cwt. 3 qr. 7 lb.; Southern Queen, 4 tons 6 cwt. 1 qr. 20 lb.; White Yam, 3 tons 4 cwt. 0 qr. 12 lb.; Pierson, 3 tons 4 cwt. 0 qr. 12 lb.

## Poultry Notes.

NOVEMBER.

#### V. H. BRANN, Acting Poultry Expert.

AUTOMATIC systems, transport and other services are enjoyed to-day that did not exist a decade ago, making it possible to increase substantially the number of layers it is possible to maintain on the farm, but these facilities have also added to the capital outlay and cost of production. Without discussing the relative merits of the various systems or combinations of systems of feeding, it may be said that there is still room for experiment work in this connection from an economic aspect. The principles of nutrition, however, are the same whatever method of feeding is employed.

Principles of Feeding.

Whichever system of feeding ("wet" or "dry") is adopted, the balance of the ration must be retained. A "balanced" ration is one in which the food constituents are in correct proportion, so as to give the best results without loss of health or constitutional vigour. Although the foodstuffs suitable for poultry are numerous, from an economic viewpoint the choice is very limited, the determining factors being palatability, digestibility and nutritive value.

The ratio of digestible proteins (nitrogenous substances) to the carbohydrates (sugars and starches) and fats in a balanced ration for layers is 1:4.5. For growing stock the ratio should be wider—1:5. Too large a proportion of foods of a bulky nature, such as greenstuff which has a high water content, does not enable the bird to consume such quantity as will provide sufficient nourishment. A ration containing the principal foods (bran, pollard, lucerne meal, and whole and ground wheat and maize grains) requires also the addition of some food with a high percentage of protein to balance it for layers. An animal food such as meat or meat meal is preferable, but it is very inadvisable merely to add different substitute foods and especially concentrates to a set ration without alteration to the proportions of foods already contained in it.

The provision of all necessary requirements to ensure good health and development in the growing chick will greatly assist it on reaching maturity to give better results. The narrow ration designed for high egg production is detrimental to young stock, and concentrates are better eliminated, at any rate for stock under three months old. Forced feeding causes too early maturity, which tends towards degeneracy and the laying of small eggs.

A greater amount of calcium phosphate than is present in the principal foods is desirable, and this can be supplied by bone meal. Milk, too, is very beneficial. The foods mentioned provide sufficient mineral requirements with the exception of common salt, while calcium carbonate (very necessary for layers) is present in shell grit, which should always be available to them.

The place of greenstuff in the diet must be recognised, but more as affecting the general health of the birds than for its actual food value. Suitable succulent green foods can be given as a supplementary feed, but if mixed in the mash not more than 25 per cent. of the total weight should be allowed.

#### Rations Recommended.

The rations used on the Department's farms and also for the layers competing in the Hawkesbury Agricultural College egg-laying competition are as follows:-

#### FOR CHICKS (FROM FOUR DAYS TO THREE MONTHS OLD).

${m Mash}.$			Evening Feed.
Pollard	•••	10 lb.	Chicken mixture to six weeks, and
Bran		5 lb.	one-third wheat and two-thirds
M.I.B. Bonemeal		1 lb.	cracked maize thereafter.

If skim-milk is not available for the mixing of the mash, skim-milk powder dissolved in the water at the rate of 1 lb. to each gallon may be used as the equivalent. If fed dry, 1 lb. of the powder to 20 lb. of mash is the correct proportion.

From four days to six weeks feed five times per day-four times on moist crumbly mash, and once on chicken mixture. The latter should be the last feed of the day just before dusk.

From six weeks to twelve weeks feed four times per day—three times on mash and once on mixed grain ration, consisting of wheat and cracked maize instead of the chicken mixture. The grain ration should be the last feed of the day.

From twelve to twenty-four weeks feed the morning mash given below for adult birds, with an extra feed of mash without meat meal at mid-day, and grain ration, as for adult birds, in the evening.

#### RATION FOR LAYERS.

Morning Mas		Evening Feed.						
Pollard	12 lb. 🤻	Two-thirds wheat and one-third						
	4 lb.	eracked maize.						
	3 lb.							
M.I.B. meat meal .	1 lb.							

One ounce of fine common salt to every 5 lb. of mash should be dissolved in the liquid with which the mash is mixed. When given as a dry mash only half of this quantity should be used and care should be taken that it is evenly distributed in the mixture. More bran can be substituted for the lucerne meal if desired, but the latter gives variety to the mash. Ground wheat or maize can displace up to 40 per cent. of the bran and pollard, but is an advantage only if more economical to use. Any changes in feeding should be made gradually.

#### Quantity of Food Required.

The amount of food the layers require varies with the seasonal production and the laying capacity of the individual bird. Higher producers are comparatively heavier eaters. There is no material difference in the amount of food required by the different breeds. The flocks should receive as much food as they can consume in at least two feeds per day, but if dry mash is given a supply should always be maintained in the hoppers. As a guide it may be said that the approximate average amount is 4 oz. per hen per day, being 2 oz. of mash in the morning and a similar amount of grain for the evening feed. This quantity is exclusive of greenstuff given as a supplementary feed.

#### Place Young Stock on Clean Ground.

Adult stock are freer from epidemic troubles during the spring months than at any other part of the year, the majority of losses occurring from chronic or constitutional diseases, various casual complaints, and the ovarian troubles to which layers are susceptible. It is common to see houses filled to their utmost capacity and yet for good results to be obtained at this time of the year, though, fortunately for the safety of the birds under the adverse conditions which will prevail during the summer months, the usual culling of the flocks and consequent thinning down of the numbers will soon take place. The owner, not realising the harmful results, continually increases the number in making housing room for the new season's stock. It is more particularly during the summer that crowded houses mean poor egg laying and an earlier moult. Moreover, later in the season, if the birds receive any set-back it becomes increasingly difficult to bring them back into laying condition.

To place the young stock on stale ground also increases the danger of epidemics and militates against good development. There is no sounder policy than to place the young stock on clean and free range, and to eliminate the crowding problem by housing in small numbers and leaving them under these conditions until matured and there is ample room to accommodate them in the laying houses. It is therefore necessary to have a portion of the farm set aside entirely for growing stock, where it is not possible for it to be contaminated by drainage from yards where adult stock are kept.

#### Poultry Parasites which Infest the Houses.

The red mite (Dermanyssus gallinae) and fowl tick (Argas persicus) are the most common of the parasites which infest poultry houses. Several types of fleas, some of which are peculiar to poultry, are also troublesome in different localities. They are all bloodsuckers. The mite and tick find harbour in the crevices of the roosts and walls of the houses and in close proximity to where the birds roost at night. Once introduced, they can live for a considerable time without food. Both parasites feed at night, and remain secreted in the house during daylight. They are most active in the warmer months of the year, and multiply very rapidly. In the process of feeding, the fowl tick infects the blood stream of the fowl with the organism causing "tick fever." This disease causes heavy losses. It is more commonly found in the hot dry districts, but occasional cases have been found in the metropolitan area, probably introduced by coops or birds carrying the larval tick from infested houses. This pest is the greatest curse of poultry-keepers in the country districts. It is really more easily eradicated than mite,

being a larger insect but succumbing just as easily by contact with oil emulsified oil sprays. Very frequently, however, poultry are kept in tidistricts where little attention is given to the housing and the condition under which the birds are kept. Dilapidated houses, of very roug material, and permitting the birds to roost in trees, fences and sheds adjoing large buildings render spraying impracticable.

The red mite has a more indirect effect on its host, causing low-vitality and emaciation. It is indirectly responsible for many troubles, although it does not infect with any specific disease. Its presence is not always detected until the birds become unthrifty or anaemic in condition. Effective control measures demand only a small amount of time and expense. The houses should be situated quite apart from other structures and care should be taken that the birds roost in the quarters provided for them. Painting the roosts with wood-preserving oil, or even waste motor oil is a safeguard. Poultry-farmers are warned that creosote and arsenic compounds are sometimes sold as wood-preserving oil. The roosts should be removed if painted with these substances and not replaced until dry. Crude petroleum is not injurious to the legs and feet of the birds.

When the houses are infested it is essential to spray with a force pumpto ensure penetration of spray to all parts of the building, including roosts, walls and roof. Two or three sprayings at intervals of a few days may be necessary in cases of heavy infestation. Kerosene emulsion makes a cheap and effective spray.

#### To make Kerosene Emulsion.

Kerosene emulsion is made by dissolving ½ lb. of soft soap in 1 gallon of boiling water, and then adding slowly a gallon of kerosene, stirring briskly all the time and for a few minutes afterwards. This stock solution is then added to 9 gallons of soft water, preferably warmed. The mixture should be stirred occasionally while using.

#### WHY NOT A CAREER ON THE LAND FOR YOUR SON?

Parents who have not definitely mapped out a career for their sons, who perhaps intend leaving school after this year's intermediate or leaving cortificate examination, would do well to make the fullest inquiries concerning the twelve-months' special course of instruction in farming which has been established at the New England Experiment Farm, Glen Innes. The operations at this farm are diversified, embracing the growing of such crops as oats, maize, wheat, potatoes, and fodders, orcharding, dairying, sheep-raising and general live stock management, while special attention is given to pasture improvement investigations and plant-breeding operations. Poultry-farming is carried on as a sideline.

The fee for the course is £10, including board and lodging, and applicants for admission must be at least 16 years of age, although in special cases

exceptions are made in this regard.

Applications for admission to the course should be forwarded to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney, from whom any further particulars may be obtained.

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1st December, 1930.

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## Grass Silage.

AN EXCELLENT METHOD OF STORING EXCESS PASTURE GROWTH.

J. N. WHITTET, H.D.A., Agrostologist.

During a recent visit to New Zealand, the writer was greatly impressed with the practice adopted there of converting surplus growth of pasturage into grass silage, especially in districts of heavy rainfall where the curing of grass hay is rendered difficult by the moist conditions generally experienced during the drying period.

In the far North Coast districts of New South Wales, humid conditions are experienced for the greater part of the year, and although the curings of hay may be possible at times during the summer months, hay, even when well stored, frequently becomes very mouldy and in consequence is rendered unsuitable as feed for dairy stock. The alternative method of conserving surplus pasturage in the form of grass silage is therefore suggested, as light falls of rain on the cut material will not affect the subsequently cured product to any extent or seriously hamper the storage operations.

#### Mixed Pasturage Produces Good Silage.

A mixture of grass and clover growth makes a silage of excellent quality and produces a well-balanced feed for stock. The pasturage packs together well, and the loss on the outside and top of stack is considerably less than where coarser materials of the nature of maize and sorghum are stacked, as air and rain are excluded to a greater extent.

In addition to surplus pasture growth, any of the finer-stemmed crop plants such as wheat, oats, barley, Sudan grass, feed millets and legumes of the types of field peas and vetches, which are not required as green feed or hay, can with advantage be included in the grass silage stack. Similarly cuts of lucerne containing weed and grass growth, or others which it is found impossible to cure satisfactorily as hay, can be included.

#### The Time to Cut.

The stage of growth at which to harvest pasturage for silage will largely depend on the purpose for which the material is to be utilised. If a maintenance food is required, the pasturage should be harvested when the majority of the plants are forming seed heads; this product will be suitable for feeding to dry and young stock.

As young, leafy grass is more nutritious than that approaching the seed-forming stage, it naturally follows that silage made from the former will be more suitable for feeding to cows in milk. It should be stored in over-head silos or boarded pits in order to reduce the amount of wastage that would occur if placed in stacks. The time to harvest this class of feed would be prior to the grasses showing any signs of stem growth.

If pasturage is very mature before being harvested, or is allowed to become too dry before being stacked, the amount of moisture present will be insufficient to promote the required amount of fermentation, and a charred product will result.

#### Control of Rank Growth Improves the Sward.

Dairy-farmers in the south coast and central coast divisions of this State are now realising the value of the mowing machine for controlling the rank growth that is produced on and is typical of most paspalum pastures in good seasons. By converting this growth into grass silage, not only is a valuable laxative standby for winter feed conserved and an insurance

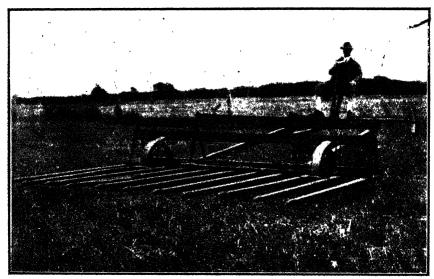


Fig. 1 .-- A Two-horse Sweep or Push Rake.

against dry conditions created, but the paddocks are put in better condition for the growth of the finer grasses of the type of Perennial Rye and Cocksfoot, as well as of the clovers.

Where rank-growing grass is present in a paddock, the full value is not obtained from fertiliser, and the smaller-growing forms of pasture plants are crowded out; after the rank growth of grass is removed, an application of 2 cwt. superphosphate and 1 cwt. sulphate of ammonia per acre applied in the autumn directly after a good fall of rain will considerably stimulate the growth of these more palatable and nutritious pasture grasses and also of White clover, and the paddocks will then be in excellent condition to go into and through the winter grazing period.

#### The Silage Stack.

The method of storing surplus pasturage in a stack is generally adopted where large quantities of feed are available, for the stacks are cheaply

constructed and can be built in the paddocks in which the feed is growing, thus saving the expense of extensive haulage when cutting and later when feeding out.

Round stacks give excellent results and are comparatively easy to build. Settled stacks of this type 12 feet high by 15 feet in diameter should contain 30 to 35 tons of silage. It is most essential that enough material be used to give sufficient height and so provide a stack, which, when it has settled, will be at least 9 to 10 feet high.

The amount of shrinkage in this type of fodder when stacked is fairly considerable, and it will be necessary to ensile about 50 tons of green pasturage to produce 40 tons of silage. Stacks should be located on high, well-drained situations.

#### Harvesting and Stacking Pasturage.

The mowing machine is used to cut the pasturage, which is then raked into windrows. Horse sweeps or push rakes (see Fig. 1) are generally used to convey the grass to the stack. A two-horse sweep 10 feet wide will carry a load of from 400 to 450 lb.; this type of instrument is also very useful for hay-making operations (grass or lucerne hay). In New Zealand the mast stacker and grab (see Fig. 2), worked with one horse, is almost universally jused to elevate the material to the top of the stack.

It is advisable to cut enough material to build the stack 5 to 6 feet high the first day; no grass is added to the stack for a few days in order to allow it to settle and so provide a solid foundation on which to build the

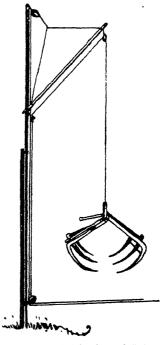


Fig. 2 .- A Mast Stacker and Grab.

stack. This is most important, as a stack erected on a faulty foundation is sure to slip as it settles.

It is advisable for the beginner to make use of a thermometer to assist him in controlling the temperature of the stack during stacking operations, though after a few seasons' experience it will probably be dispensed with.

In order to obtain the temperature of the material in the stack, a piece of 1-inch water piping 5 to 6 feet long should be driven down the centre of the stack and an ordinary dairy thermometer, attached to a piece of string, lowered down the pipe; this can be examined as required to ascertain the temperature. A sharpened stick hammered into one end of the pipe will enable it to be easily driven into the stack.

Once the temperature has attained 110-120 degrees Fahr., stacking can be continued. The addition of more material should be carried out at once if the heat gives indications of rising above 120 degrees; this will have the effect of checking the increase in temperature. Remove the pipe and thermometer when applying more material and repeat the operation of ascertaining the temperature at the end of each stacking period; the stack is generally added to about every second day until the desired height is attained.

All cut material must be handled expeditiously in order to retain its moisture. Do not cut more feed in any one day than it is possible to work and stack during that period.

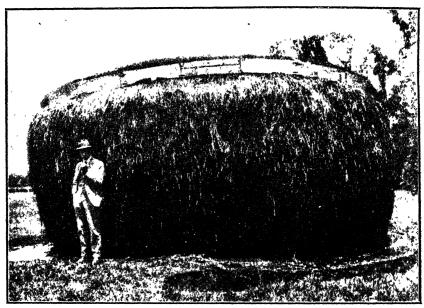


Fig. 8.—A Well-built Grass Sliage Stack.

This stack contains Perennial Rye, Cocksfoot, Paspalum and Clovers. Note the boards for retaining the soil on top of the stack.

In building the stack, the outside must be well tramped, and the centre kept level until finishing off, when it should be slightly higher than the outside.

#### Weighting the Stack.

Soil is generally used to weight the top of the stack and incidentally to regulate the temperature of the top layer. Boards or bags of soil should be placed around the edge of the top of the stack in order to retain the soil in position; there should be a depth of 10 to 12 inches of soil at the outer edge, increasing to 18 to 24 inches in the centre. The amount of soil used will vary according to the temperature of the last 6 feet of material stacked, and the amount of pressure required effectually to compress the top layer and

exclude the air. The boards used to retain the earth on top of the stack shown in Fig. 3 are 10 inch x 1 inch and 2 feet 6 inches in length. They are stapled together with pieces of fencing wire.

It is essential to see that the stack settles evenly. Some control of this settlement may be exercised by moving the soil as required, or, if necessary, more can be added.

The stacks, on completion, should be enclosed from stock by the erection of temporary barbed-wire fences.

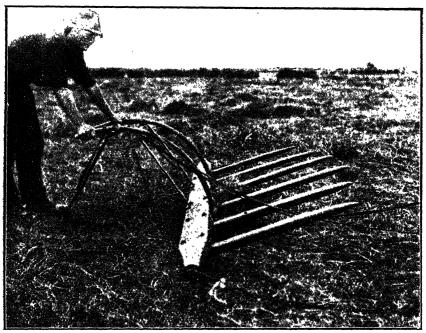


Fig. 4.—A One-horse Tumble Sweep.

Note the swivel chain attachment on the baseboard, which enables the sweep to be tipped easily.

#### Opening up the Stack.

As the best quality silage is produced in the heart of the stack, care must be exercised to expose as small an area as possible to the air, because moulds form rapidly and the silage deteriorates in consequence.

Remove the boards or bags and the soil from one portion of the stack, taking care to see that the remaining protective covering is not unduly disturbed, and cut the silage out in a face right down to the ground level before commencing on another section of the stack. The area worked on will depend on the size of the herd to be fed, but only enough should be cut out each day to supply the animals with sufficient feed for that period. A special silage knife is the best implement to use for this purpose.

#### Pit and Hillside Silos.

The use of the tumble sweep (see Fig. 4) or the push rake saves considerable handling in pit silo work, and in the case of shallow pits having batters at each end the pasturage collected with tumble sweeps can be drawn in and tipped over that already stacked, the horses doing good work in tramping the material. The soil excavated from the pit should be used to bank up the sides of the pit above ground.

Stack the pasturage as high as possible to allow for shrinkage; filling every second day will allow the material to settle down before a fresh supply is added. On completion cover with hav weighted down with soil.

Hillside silos built in the sides of gullies, or in similar positions, allow of filling from the higher side and emptying on the lower level. The centre of the silo, as well as the walls, must be well tramped by the worker in the silo, otherwise the centre will settle rapidly and tend to pull the material from the walls, thus leaving a large air space between the outside of the silage and the walls of the silo. The hillside silo can be finished off in a similar manner to the pit silo.

Grass silage can be used in from eight to ten weeks from the time of stacking, although if left for a longer period a more matured product will be obtained.

In addition to the information gathered during inspections of grass silage operations in progress in various localities in New Zealand, the writer is indebted to Mr. J. W. Deem, Director of the Fields Division, Department of Agriculture, New Zealand (whose writings on this subject have standardised methods of grass silage making in the Dominion) for valuable data on the subject reviewed.

#### THE IMPLEMENTS TO USE IN WORKING THE FALLOWS.

The implements that should be used in working the fallows depend very much on the nature of the soil and the state of the fallow. If the soil is medium to heavy loam and is free from weeds, the harrows or springtooth cultivator would serve. If semi-alluvial brown loam, light red loam, or heavy black self-mulching soil, and free from weeds, the harrows would be the most suitable implement. If heavy red loam or clay country, or if weeds are prevalent, the rigid tine scarifier should be used. The disc cultivator is without a doubt the implement which puts the fallow in the worst condition. Admitting its value in destroying large weeds, these could almost always have been killed while quite small by other implements.

The determining factor in the choice of implements, however, is usually the amount of weed growth present. It is often possible to deal very effectively with weeds when very young by the use of the harrows, but should they become too big, the rigid tine cultivator with suitable points will put the fallows in excellent condition. The rigid tine cultivator or scarifier is the most satisfactory implement for most classes of soil.

## Pasture Improvement Competition at Nimbin.

L. W. McLENNAN, B.Sc.Agr., Assistant Agrostologist.

This competition, inaugurated by the Nimbin Agricultural and Industrial Association, was judged on 1st October, 1930, and was won by Messrs. Williams Bros. Nine competitors each submitted four \(\frac{2}{4}\)-acre plots, which had been treated as follows:—

No. 1 Plot-1 bag superphosphate per acre.

No. 2 Plot-Untreated.

No. 3 Plot—1 bag of a proprietary mixture (4 parts superphosphate and 1 part sulphate of ammonia) per acre.

No. 4 Plot—Treatment optional.

Fortunately, competitors selected types of soils and various aspects characteristic of the district so that information relating to all conditions might be obtained. Pastures consisted almost entirely of paspalum and white clover with some Parramatta grass, Paddock Love grass and other tussocks on the hills. The presence of Carpet grass in many of the plots is to be regretted. This grass is comparatively unpalatable, of poor feeding value and was neglected by stock. For this reason it seeds freely and is undoubtedly spreading.

Pastures were top-dressed and grass seed broadcasted in April and May, after which the plots were grazed fairly continuously until the middle of September, when they were closed to stock in order to allow two weeks' free growth before judging.

In all cases the fertilised plots showed an increase in bulk of pasture, represented chiefly by white clover. The difference was most marked on the flats and on the better types of soil, and results showed that pastures should be eaten short before the fertilisers are applied. The superphosphate plots were slightly superior to those treated with the proprietary mixture, but the nitrogen in the latter mixture may give a greater stimulus to the summer growth of paspalum. There was a heavy growth of clover on all plots on the flats, but much less on the hills. A mild winter with plentiful rains had encouraged an abundant growth of clover throughout the North Coast. In spite of this there was a most remarkable increase in clover on the properties of Messrs. Williams Bros. and G. W. Morton. On the latter property the increase could not have been less than 500 per cent., whilst on the former, though clovers covered all plots, the increase in bulk, vigour and vitality was very marked. This was the winning entry and is undoubtedly the best clover paddock in the district.

On several of the No. 4 plots (where treatment was at owner's option), red and white clover and grasses such as Perennial Rye, Wimmera Rye, Italian Rye, Cocksfoot and Prairie were broadcasted. Germination was

fair, but growth was slow. Clover was thickened by broadcasting seed on short paspalum in the autumn, but grasses sown in the same manner were unable to make headway against the rapid-growing paspalum, which is so firmly established in this district. The abundance of clover in association with the paspalum provided an excellently balanced ration of high feeding value and ideal for milk production. Plots had not been allowed to grow rank or become sod-bound, but had been harrowed, thus encouraging the growth of short, succulent, highly nutritious feed. Careful management which permits the growth of pastures such as these is one of the most important features of pasture improvement on the North Coast. On some plots the harrow could have been used more often, but it was pleasing to note that dairy-farmers are realising that good pastures must be harrowed frequently.

The results of this competition show that the top-dressing of Nimbin flats combined with thorough pasture management will increase their productive capacity considerably and should prove to be a sound economic proposition. On the hills it is doubtful whether the expense would be justified unless the rank growth is controlled and the harrow used frequently.

	LADIA	s OI I OIL	ios mitoto	su.		
Competitor.	Improve- ment effected in bulk of pastures.	Presence of clovers and other legumes.	Palatability and feeding value.	Freedom from weeds, other use- less plants and disease.	Manage- ment of pasture.	Total Points,
Maximum points	. 25	20	20	10	10	*85
J. S. & H. E. Williams 21		20	19	9	10	79
E. W. Morton	. 22	18	18	9	7	74
D. E. Williams	. 16	18	18	9	9	70
A. Allsop	. 18	16	16	9	9	68
J. N. Brown		14	16	9	8	62
R. Gall		12	14	9	6	54
J. A. Ritchie		14	12	7	7	52
R. G. Cullen		13	12	8	7	51
W. L. Allsop	] 11	12	12	7	5	47
	1	<u>l</u>	1			

TABLE of Points Allotted.

#### Infectious Diseases Reported in October.

THE following outbreaks of the more important infectious diseases were reported during the month of October, 1930:—

Anthrax	***		***	***	•••	•••		1
Blackleg	***	•••	•••	***	***	***	•••	10
Piroplasmo	sis (tic	k feve	r)	•••	***	•••	•••	Nil.
Pleuro-pne	umoni	a conta	giosa	•••	•••	•••		2
Swine feve	r	***	٠.,	•••	***	***		Nil
Contagious	pneur	nonia	***					Nil.

<sup>-</sup>MAX HENRY, Chief Veterinary Surgeon.

<sup>\*</sup> As the size of plots was limited by the Association, points were not allotted for "Area," which, according to the original scheme, was to receive a possible of 15, thus bringing the total to 100.

### Wheat as a Stock Feed.

E. S. CLAYTON, H.D.A., Senior Experimentalist.

Wheat is such a valuable food for human beings that unless it is of inferior quality it is rarely fed in quantity to stock. However, when the price of wheat drops to a low level it immediately comes within the range of feeds available to the stockowner. With a low price operating for wheat, the producer can, if he has the facilities, feed the grain to stock, and in this way obtain a higher return for his wheat than if he sold it in the ordinary way, always providing that the price of beef, mutton, pork or bacon, etc., remains satisfactory. While the price of wheat remains at the present low level, rather than sell all their wheat many farmers will seek more profitable ways of disposing of it.

#### Diversified Farming.

There are difficulties in the way of a quick change over to stock feeding. The facilities are not generally available and they have to be provided gradually. It is thought that if wheat growers, particularly those in the more favoured rainfall districts, were to pay more attention to the raising and fattening of stock, such as fat lambs, steers or pigs, their farming would be more diversified, and they would be in a better position to increase their stock-fattening activities quickly whenever the price of wheat dropped to a sufficiently low level to permit of its use for this purpose.

During periods of normal wheat prices little if any wheat would be fed to the stock, which would be catered for by the growing of suitable fodder crops, particularly lucerne, which has proved so successful in most of the wheat districts. Field peas also offer great possibilities in those wheat districts with a good rainfall. They fit into the rotation with wheat in a most satisfactory manner. The peas are either grazed off by sheep or pigs or the grain is harvested and bagged. The South Australian experience with field peas is that when the price drops below 5s. a bushel it is more profitable to use the peas on the farm for fattening wethers or lambs. They are also a particularly valuable feed for pigs and cattle and in the ration combine admirably with wheat. They are rich in protein and balance the carbohydrates in wheat.

COMPARATIVE Analysis of Wheat, Maize and Field Peas.

					Carbol	ydrates.	
		Water,	Ash.	Protein.	Fibre.	Nitrogen-free Extract.	Fat.
Wheat Maize Field Peas	***	per cent. 10·2 10·5 9·2	per cent. 1-9 1-5 3-4	per cent. 12.4 10.1 22.9	per cent. 2·2 2·0 5·6	per cent. 71-2 70-9 57-8	per cent. 2·1 5·0 1·1

#### Local Experience with Feeding Wheat.

Experiments in the feeding of pigs were conducted in 1929 by the Department of Agriculture at Hawkesbury Agricultural College. (See Agricultural Gazette of N.S.W., July, 1930.) Ricc and wheat were compared in these trials. Rough rice was worth £7 10s. per ton, or .8d. per lb.; wheat was valued at £10 5s. 4d. per ton, or 1.1d. per lb., or 5s. 6d. per bushel.

Even at this price feeding wheat to pigs proved to be profitable. The cost of the rice ration was £1 10s. 2½d. and it resulted in an average live weight gain of 80.7 lb., so the cost of the feed per lb. of grain was 4.475d. The cost of the wheat ration was £1 13s. 10d. and the average live weight gain 91.1 lb., so the cost of the feed per lb. of gain was 4.461d. The value realised per lb. of grain in the case of the wheat-fed pigs was 5.65d. per lb. If the cost of grain (viz., 4.461d.) is subtracted, it leaves a profit per lb. gain of 1.189d. These figures are quoted to illustrate the possibility of feeding wheat to pigs at a profit, even when the wheat is worth 5s. 6d. per bushel. This actually offers the grower an opportunity to obtain 5s. 6d. per bushel for his wheat, provided he can market his pigs at a satisfactory price. The price of pork on 21st August, 1929, was 9d. per lb., and this was the figure used in computing the above results. As stated the gain over and above the 5s. 6d. per bushel allowed for the wheat was 1.189d. per lb., which more than compensates for the time and labour expended in attending to the pigs.

#### Foreign Experience.

American experience in feeding wheat to lambs is that they made the same gains as those fed on maize and only required 2 per cent. more grain and hay for each 100 lb. gain. Wheat is slightly better than barley for lambs, and less of it is required for 100 lb. gain in live weight.

English experiments with lambs also confirm American results. In America it has been shown that good quality wheat is worth as much as maize for feeding pigs. Pigs fed wheat and tankage made slightly more rapid gain and required 3 per cent. less feed per 100 lb. gain than those fed maize and tankage. When fed without any supplement wheat was also found to be superior to maize.

In Ireland, pigs fed on wheat gave much better results than those fed on bran and pollard.\*

Wheat is a suitable feed for calves, fattening cattle and dairy cows. For dairy cows in Denmark, ground wheat was fully equal to mixed barley and oats. Provided the price is low, wheat can also be fed with economy to horses.

#### How to Feed.

Pigs.—Wheat, like maize, needs the addition of a supplement when fed to pigs. Any palatable roughage rich in protein is satisfactory. If the pigs are on good grass or lucerne pastures they will make rapid and economical gains when wheat is added to the diet. When stall feeding with wheat it is

<sup>\*</sup>Insh Free State Jour. Dept. Agr., vol. XXIX, No. 2, p. 172.

## 5 SPECIALTIES

## FOR MARKET GROWERS

#### Read what the Growers, themselves, say-

#### CAULIFLOWER—Yates' Phenomenal Maincrop.

From Victoria:

Just a word to tell you the result I am having from the seed I got from you last year. I am at present cutting Phenomenal Maincrop Cauliflower, and they are topping the Melbourne Market both for price and quality. They stood the drought and the blight and grub pest, and that speaks for itself, as this season is one of the worst ever experienced in Victoria.

#### CAULIFLOWER-Yates' Phenomenal Early.

From N.S.W .:

I am sending you this specimen of Early Phenomenal Cauliflower, one of many ot similar size, grown from seed which I purchased from you last year. Personally, I wish for nothing better; they were most profitable.

#### CABBAGE—Henderson's Succession (Peter Henderson's own stock).

From Victoria:

I have just finished cutting your Henderson's Succession Cabbage. We had the driest summer on record, so I did not go to much trouble with them. The ground was rough, and they only had a drop of water when planted out, and a little flood manure. They were hardly touched by blight, and I only planted out about 500 on account of dryness. I was sorry afterwards, as I did not have one failure amongst them, and plenty of them measured 18-20 inches across and had very solid hearts.

#### CABBAGE—Early Drumhead Yates' Derwent Re-selected Type.

I had a fine bed of your Early Drumhead Cabbage last year, about one acre, and the prices realised were from 4/- to 12/6 per dozen. Needless to say, I did very well with them. I finished cutting about October, and although in many of my neighbour's crops the Cabbages were running to seed, I can truthfully say that none of mine showed any signs of doing so.

#### CABBAGE—Earlimarvel.

The earliest Flat Cabbage we have grown. In appearance and habit it is like a miniature Succession, and should become a very useful early market sort.

Market Growers are invited to write for Current Price List of Vegetable Seeds (in bulk), in which very advantageous prices are quoted for buyers of the larger quantities.

All quotations submitted and all orders accepted are subject to our printed conditions of sale.

## ARTHUR YATES & Co. Ltd.

SEED GROWERS, SEED MERCHANTS, AND NURSERYMEN.

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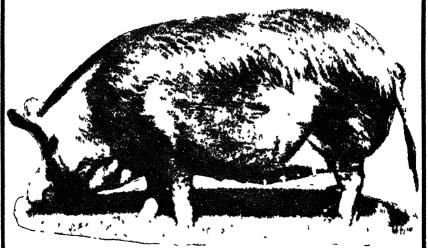
**SYDNEY** 

Warehouse: 184-186 Sussex St.

### DEPARTMENT OF AGRICULTURE

NEW SOUTH WALES

## STUD PIGS for SALE



Tamworth Sow, "Inge Viola" (Imp.)

Stud pigs of BERKSHIRE and TAMWORTH breeds are available for sale at—

Hawkesbury Agricultural College, Richmond. Wollongbar Experiment Farm, Lismore.

#### BERKSHIRE pigs only are available for sale at-

Grafton Experiment Farm, Grafton.
Bathurst Experiment Farm, Bathurst.
Wagga Experiment Farm, Bomen.
New England Experiment Farm, Glen Innes.
Cowra Experiment Farm, Cowra.

Breeders are reminded that at the above institutions the studs have been augmented by importations of the best and latest strains available of Berkshire and Tamworth pigs from Great Britain.

Full particulars regarding prices, &c., can be obtained on application from the Principal, Hawkesbury Agricultural College, Richmond, or from the managers of the farms mentioned.

G. D. ROSS, Under Secretary, Box 36A, G.P.O., SYDNEY.

advisable to include in the ration a food of animal origin that is rich in protein, such as skim-milk. Field peas are also of great value for feeding with wheat. The wheat should be ground or rolled for pigs. This treatment has the effect of greatly increasing the feeding value. It should not be ground too finely, as it then tends to form a sticky mass in the mouth of the pigs. Soaking the wheat is of very little value and does not justify the trouble involved; moreover, it is not nearly so satisfactory as grinding.

Lambs.—The best results are obtained with lambs when the wheat is fed with legume hay. This has the effect of balancing the ration. Wheat fed to lambs on good pasture gives good results.

Cattle.—Wheat should be fed with some bulky concentrate for the best results with dairy cattle. It should be ground or rolled for all cattle.

Horses.—Wheat should be fed only in moderate amounts and mixed with a bulky concentrate or with chaffed forage. If fed in excess it may cause digestive troubles and skin eruptions.

#### Pure Seed.

#### GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture publishes monthly in the Agricultural Gazette a list of growers of pure seed of good quality of various crops in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

A grower's name is added to the list only (1) after the crop has been inspected during the growing period by a field officer and favourably reported upon, and (2) after a sample of the seed has been received by the Under-Secretary, Department of Agriculture, Sydney, and has satisfactorily passed a germination test.

Intending purchasers are advised to communicate direct with growers regarding the prices for the seeds mentioned hereunder. In the event of purchasers being dissatisfied with seed supplied by growers whose names appear on this list, they are requested to report immediately to the Department.

Pure seed growers are required to furnish each month a statement of the quantity of seed on hand. Such statement must reach the Department, Box 36A, G.P.O., Sydney, not later than the 12th of the month.

Maize—
Large Goldmine ... P. Short, "Moore Park," Armidale.

Sorghum—
Sumac ... ... Manager, Experiment Farm, Bathurst.
Saccaline ... ... Manager, Experiment Farm, Grafton,
A. S. Pankhurst, 36 William-street, Singleton.
Collier ... ... Manager, Experiment Farm, Grafton.

A number of crops were inspected and passed, but samples of the seed harvested have not been received, and these crops have not been listed.

Get land ready for the sowing of autumn crops, and cultivate the fallows to destroy weeds and to restore a mulch after rains. Working the soil during the hot summer months is not recommended unless rain has destroyed the mulch.

## Varieties of Wheat in New South Wales.

J. T. PRIDHAM, H.D.A., Plant Breeder, and A. R. CALLAGHAN, D.Phil., B.Sc., B.Sc.Agr., Assistant Plant Breeder.

The great diversity of conditions under which wheat is grown in New South Wales—differences of temperature, of length of season, of rainfall (in both amount and incidence), of soil—have been responsible for the use of a large number of varieties with a wide range of characters. The necessity for the use of at least two or three varieties on every farm, so that the season's work may be distributed, and so that the risk of a poor crop of low yield over the whole area may be avoided should the season fail to suit a particular variety, tends to add to the list of wheats grown in the State. Furthermore, the different purposes for which wheat is grown, viz., grain only, dual purpose (grain or hay as the season may dictate), hay only, green feed, &c., add complexity to the widely different qualities required to suit all conditions and requirements.

Probably well over one hundred wheats are grown in New South Wales, but of these only about forty or fifty varieties have an area of over 1,000 acres. These and some of the more recently evolved varieties of the Department which are likely to make more headway in the near future are therefore considered to be of sufficient importance to justify the detailed description given.

The question of identification of the chief varieties of wheat grown by farmers is of importance from the standpoint of suitability to the conditions and also of pure seed production. In the descriptions which follow, these points have been given much closer attention than hitherto. More exact observations have also been made on the reaction of varieties to different diseases, which is nowadays of much greater moment than previously to the grower in the choice of the most suitable wheats for his conditions or circumstances. For instance, where flag smut or rust is feared, the grower can sow the resistant varieties which are available with the assurance that a heavy toll of the crop will not be taken before the crop is harvested.

Not all the varieties described herein are recommended by the Department, but they are included because, being already grown fairly extensively or considered at present very promising, they are of interest to wheat-growers generally. The Department's recommendations form the subject of a leaflet which is revised annually from the results of systematic variety trials on farmers' experiment plots throughout the wheat areas of the State.

The varieties described herein are given in the order of their relative incortance in New South Wales at the present time.

#### Waratah.

Waratah is the result of a cross made at Wagga Experiment Farm in 1907 between Hudson's Early Purple Straw and Gluyas Early. It was first grown in field trials at Cowra Experiment Farm in 1919.

Waratah is an early-maturing variety, of moderate stooling habit and erect early growth. Its foliage is medium wide and drooping. The straw is tall, not purple, and although slender, is of fair quality, semi-solid, and





Waratah.

Turvey.

weighs well for chaff. In spite of its slenderness the straw stands well; this is true even on the heavy black soils in the north-west, and when it does go down in wet seasons there is often considerable recovery. Should hot winds prevail early in the season the straw of Waratah is apt to be brittle, and this is associated, under like circumstances, with a tendency of the head to shatter its grain.

The brown, very short ear has strong, divergent tip-awns which are a conspicuous and very characteristic feature of the variety. In spite of the short ear, and its low density, it gains in yielding power by carrying three to four grains per spikelet when other varieties only show two. This latter character gives the ear its wide and somewhat irregular appearance. The outer glumes of the spikelets are glabrous, rather short but medium-wide with square shoulders, characters which distinguish this variety very readily from its parent Gluyas Early, which has somewhat long glumes with very oblique shoulders. The opaque grain is elliptical in shape, somewhat elongated, with a characteristically deep yellow colour and a wide fairly deep crease occasionally accompanied by a single pit mark.

Though not highly rust-resistant it has a measure of practical resistance under all but very severe conditions, the grain filling better than the amount of visible rust would indicate. Waratah is quite susceptible to flag smut, but is is more resistant to leaf blight (Septoria) than many other varieties in cultivation. It has largely displaced Canberra since 1925 because it is less liable to rust and loose smut and has stronger straw.

Waratah represents a combination of the grain excellence of Purple Straw with the hardiness and early maturity of Gluyas Early, and is very productive both for grain and hay. In spite of its defects it has made rapid strides in popularity, as evidenced by the increase in area from 122,839 acres in 1925 to 817,138 acres in 1929, at which time it was the leading variety in New South Wales.

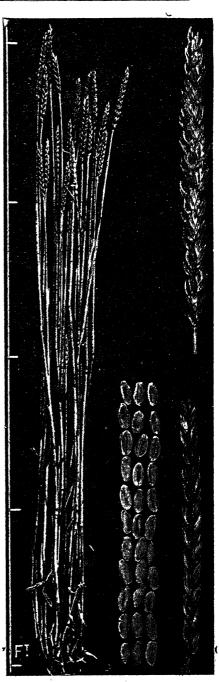
Waratah is recommended by the Department as an early-maturing variety for grain and hay on the Central and Southern Tablelands, South-western Slopes and Eastern Riverina, Central-western Slopes and the North-western Slopes; and for mid-season sowing on the South-western Plains, Western Riverina and Western Plains. The fact that the variety thrives under such a wide range of conditions has placed it in the premier position it holds to-day.

#### Federation.

Federation originated from a cross made at Lambrigg, near Queanbeyan, by the late Mr. W. Farrer in 1895, between a Purple Straw selection and a Fife-Indian crossbred, later named Yandilla. This was a premeditated attempt by Farrer to produce a variety with short straw, especially suitable for the Australian method of harvesting with the stripper. The new crossbred was noted as very productive, with strong straw, and it was named in 1901. Its short erect growth did not at first appeal to the farmer used to the tall waving crops of Purple Straw and Lammas then in cultivation, but field tests soon indicated its high productiveness and it quickly displaced these varieties, becoming generally grown throughout Australia.

Federation is a mid-season variety, of average tillering ability, erect in early growth, with erect short-bladed foliage. These latter characters are in contrast to the drooping, wavy, long-bladed foliage of Hard Federation and offer the easiest means of distinguishing the one from the other of these varieties. Its rigid, short appearance is maintained in all phases of its





Yandilla King.

Federation.

growth, and is the most conspicuous feature of its straw. The ability to continue standing ripe sufficiently long in the field, when intended for harvesting with a reaper-thresher or stripper, earned for it the reputation of being storm-proof. The short, stiff straw has no purple colouration, and although its colour is not good enough for the production of prime chaff for the market, stock eat the hay very readily.

The brown, compact ears are awnless, and their density, which is high, is perhaps the chief contributing factor in the high yielding capacity of the variety. The outer glumes of the ear are glabrous, clear and shiny, with no glaucousness, while the floral glumes are somewhat short, a character that allows bleaching of the grain if rain falls after the crop is ripe. shoulder of the outer glume is predominately square and only of medium width. The inner glume or palea of the spikelet sometimes remains on the grain after stripping. The ear of Federation resembles both Union and Hard Federation. The ear of Union is, however, more dense than either Federation or Hard Federation, especially at the tip, the shoulders of the outer glumes are conspicuously wider and the glumes are generally lightly glaucous. Foliage characters readily distinguish Hard Federation from either Union or Federation; in addition to these, the ear of the former is less dense, but bearing a similar number of spikelets; this makes the Hard Federation head slightly longer and laxer. The rachis between the spikelets of Federation and Hard Federation is fringed with hairs; this fringe is absent, or at least not visible without the aid of a lens in Union. The grain is in the medium-strong class, of medium size, white, soft to semi-hard, and ovate with rounded cheeks and a shallow narrow crease.

While Federation is susceptible to mildew (*Erysiphe*), stem rust, flag smut, and particularly to leaf blight (*Septoriu*), its productiveness renders it worthy of being grown as a mid-season variety except in districts where it has been replaced by Bena or Union.

In New South Wales the area sown to Federation in 1925 was 853,430 acres, which in 1929 had decreased to 679,043 acres. It is at present the second leading variety of the State, but is being rapidly superseded by Union, Bena and Nabawa. In Victoria in 1925 it was first favourite, and in 1929 was still the second most popular variety. In South Australia it was the second leading variety in 1925 and still occupies that place. In Western Australia it was the fourth variety in popularity in 1925, but to-day there is only a small acreage sown there as compared with Nabawa.

The Department recommends Federation for the following districts for mid-season sowing for grain:—Central Tablelands, South-western Slopes and Eastern Riverina, South-western Plains and Western Riverina, and the Central-western Slopes.

#### Yandilla King.

Mr. R. Marshall, of South Australia. It is a half-sister to

Federation, both varieties having the Fife-Indian wheat Yandilla as a parent. Silver King, the other parent of Yandilla King, is a white-strawed selection from Marshall's No. 3.

The young growth has a free-stooling, prostrate habit, with narrow leaves. The toliage of later growth droops over limply. The straw is of medium height, strong and capable of being converted into very satisfactory hay or chaff. The absence of purple colour in the straw is in contrast to the purple tinge that characterises Marshall's No. 3.

The ear is long, white, fusiform, glabrous and lightly tip-awned; it is carried erectly on the straw. The outer glumes are medium-long and medium-wide, with narrow square to slightly oblique shoulders. The beak of the outer glume is often slightly incurved. Yandilla King commonly loses several grains from the top spikelets of the ear by tip withering, but in spite of this it tends to mature a good crop of well-filled grain. The rather large, yellow, elliptical grain is well enclosed (in some districts hard to thresh), with rounded cheeks, and a wide somewhat deep crease, which, however, never has any deep pitting. The grain characters are distinct in these features from the grain of Marshall's No. 3, where pitting in the crease is very characteristic and is accompanied by angular cheeks. The grain of Yandilla King belongs to the medium-strong flour class.

The variety is susceptible to stem rust, and though liable to flag smut is not often badly attacked under field conditions. It is susceptible to foot rot, and moderately so to leaf blight (Septoria).

Yandilla King was grown on 182,410 acres in New South Wales in 1925. This area has increased to 431,512 acres in 1929; it is now the third leading variety, besides being the standard late-maturing wheat for the State. Yandilla King does well on heavy soils and is a more reliable cropper—less affected by wind and adverse weather—than Turvey, which is the more showy variety. For the tablelands where rust is to be feared, Cleveland is to be preferred to Yandilla King.

It is recommended by the Department for early sowing (i.e., as a late-maturity variety) for grain or hay on the Southern Tablelands, South-western Slopes and Eastern Riverina, Central-western Slopes, North-western Slopes and the Murrumbidgee Irrigation Area.

#### Turvey.

Turvey originated as a selection, made from a field crop of Purple Straw wheat by Mr. Turvey, of Rochester, Victoria.

Like Yandilla King, Turvey has a prostrate habit in early growth with very good tillering powers. Its foliage is narrow, with long leaf-blades that droop over limply. A bright purple colouration is noticeable in the leaves at the immediate junction of the leaf-blade and leaf-sheath, enveloping both the auricles and the ligule. The straw is purple tinted, tall and not so strong as Yandilla King; the variety is more prone to lodging than the latter, partly for this reason and partly because the plants of Turvey are

less well-braced and more liable to go over as a whole; in addition heavy winds cause considerable shattering of grain from the ripened ears of Turvey.

The nodding, white, tip-awned tapering ears, borne on tall purple straw give it an attractive appearance; for this reason Turvey is often entered in crop competitions. The fusiform head is lax, sharply tapering, with a drooping or so-called nodding habit when mature; these items, together with the purple straw, make Turvey easy to identify; no variety is likely to be confused with it. The outer glumes are glabrous, long, only mid-wide and with square, very narrow shoulders; low on the spikelet the shoulders of the outer glumes are almost wanting, and observed from this position appear oblique. The beak of the outer glume is prominent, narrow, acute, and often slightly incurved. The large white grain of Turvey has rounded cheeks, with no pittings in its rather shallow crease; it belongs to the weak flour class.

Turvey is quite commonly affected by loose smut and is susceptible to stem rust and flag smut. It also appears to be more susceptible to foot-rot than many other wheats. It has considerable drought resistance for a latematuring variety.

Although the fourth leading variety in New South Wales in 1929 (being grown on 281,556 acres) its percentage area has declined since 1925; it is yielding ground to Yandilla King on account of its greater susceptibility to flag smut and loose smut.

(To be continued)

#### RESULTS OF FITZROY SEED MAIZE CONTEST, 1929-30.

Five entries were received for this contest, which was carried out at Grafton Experiment Farm during the past season. The idea of these annual competitions is to determine the highest-yielding strains of Fitzroy maize.

The seed was sown on elluvial soil in a good moist seed bed on 20th December, 1929. Germination was good, but subsequent dry weather retarded early growth. Good rains in the New Year, however, relieved the position, and with the exception of a dry spell in February favourable conditions prevailed until harvesting on 9th September, 1930.

#### YIELDS in Order of Merit.

-	Coa	-	Yield p	er acre.			
7 7 7 7 1						bus.	lb.
J. B. Gallagh	er	•••	•••	•••		61	34
T. Stewart	•••	•••	•••	***	•••	58	46
J. T. Payne	•••		•••	•••		57	24
H. W. Hindn	aarsh	•••	***	***		52	55
S. G. Sky	•••	***	•••	***		50	43

The Department's certificate of merit thus goes to Mr. J. B. Gallagher,

## Maize and Sorghum Trials, 1929-30.

A SUMMARY OF THE OUTSTANDING RESULTS IN THE NORTHERN DISTRICT.

MARK H. REYNOLDS, H.D.A., Senior Agricultural Instructor.

Spring and autumn-sown variety and fertiliser trials with maize and green fodder sorghums were carried out during the past season in the vicinity of Singleton, Wollombi, Denman, Quirindi, and Manilla. The following farmers co-operated with the Department:—Messrs. C. Lynch, Wollombi; A. Robinson, Glenridding; C. Beh and B. Holz, Mitchell's Flat; S. Nicholls, Kirkton; F. Sealey, Kienbah; C. O'Hara, Denman; H. Wilson, Quirindi; L. Dunford, Mount Olive; H. Falstead, Quirindi, and W. Bignall, Manilla.

#### The Best Time to Sow Maize.

Very successful results were obtained at Singleton by sowing short season grain varieties in early September. Golden Glow, grown by Mr. A. Robinson, was the outstanding variety, yielding 54 bushels per acre, or 4 bushels more than the next best variety. The practice here indicated is considered worthy of imitation.

The sowing of long season varieties in mid-September also proved satisfactory, Pride of Hawkesbury, grown by Mr. C. Lynch at Wollombi, yielding 60 bushels per acre.

Of the mid-season varieties, Funk's Yellow Dent, sown at Singleton during the third week in September, yielded 16 bushels per acre more than the earlier maturing varieties under test.

VIELDS in the Maize Variety Trial.

Trans in the many variety fram.										
Grower.	Large Red Hogan,	Fitzroy.	Pride of Hawkesbury.	Kennedy.	Wellingrove.	Early Morn.	Golden Glow.	Golden Superb.	Funk's Yellow Dent.	Holz.
	bus.	bus.	bus.	bus.	bus.	bus.	bus.	bus.	bus.	bus.
C. Lynch, Wollombi	49	57	60	•••	•••		•••		•••	•••
A. Robinson, Singleton				50≩	493	49월	54	374	•••	•••
S. Nicholls, Kirkton				•••		•••		40 <u>\$</u>	60	44

#### Maize Fertiliser Trial.

The results of this trial once more emphasised the benefits to be derived from applying a nitrogenous fertiliser along with the superphosphates. At Mitchell's Flat, where the trial was carried out by Mr. C. Beh on a deep alluvial soil that had been cropped for some years, 130 lb. per acre of M30 fertiliser mixture (10 parts superphosphate and 3 parts each of sulphate

of ammonia and sulphate of potash) and 140 lb. per acre of a mixture of equal quantities of blood and bone and superphosphate each gave an increase of approximately 7 bushels per acre over the unmanured plot.

The yields in this trial were:—M 30 mixture (130 lb. per acro), 47% bushels; blood and bone and superphosphate (equal parts), 47% bushels; M 16 mixture (140 lb. per acre), 47 bushels; M 23 mixture (130 lb. per acre), 45 bushels; superphosphate (100 lb. per acre), 45 bushels; no fertiliser, 41 bushels. M 16 fertiliser mixture consists of 10 parts superphosphate and 3 parts sulphate of ammonia, and M 23 mixture consists of 10 parts superphosphate and 3 parts sulphate of potash.

#### The Sorghum Trials.

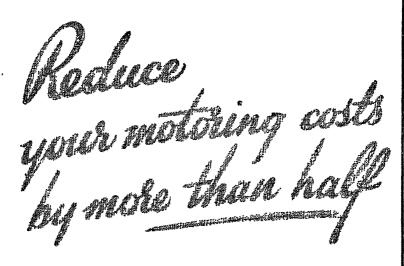
The following tables give the yields in the sorghum green fodder variety and fertiliser trials:—

	Yı	elds i	n the	Variet	y Tria	1.			
Grower.		Saccaline.	White African.	Sumac.	Collier.	Sudan.	Cowper.	Lamberts.	Gooseneck.
C. Lynch, Wollombi C. Beh, Mitchell's Flat B. Holz, Mitchell's Flat S. Nicholls, Kirkton L. Dunford, Mt. Olive		tons. 23 20 194 204	tons. 125 213 183 18 43	tons. 21\frac{1}{3} 10\frac{1}{4} 17	tons. 213 26 211 51	tons 101 91	tons.  20 	tons.  21	tons.

In the only four centres in which it was under trial, Collier gave better yields than Saccaline. Sumac, a short season variety, was greatly out-yielded and would appear to be more suitable for cooler districts than Singleton, where Saccaline and other long season varieties may be sown as late as early February and still mature before damaged by frost.

YIELDS in the Fertiliser Trial.

Grower.	M28.		M30.		M16.		Super- phosphate.		Blood and Bone and Super- phosphate.		
Grower.	Quantity Per acre.	Yleld,	Quantity Per acre.	Yield.	Quantity Per acre.	Yield.	Quantity Per acre.	Yield.	Quantity Per acre.	Yield.	Unfertilized
B. Holz, Mitchell's Flat. L. Dumford, Mt. Olive. C. Lynch, Wollombi	144	tons. 25 } 6	lb. 210  112	tons. 20  23	lb. 175 	tons. 19	lb. 122 120	tons. 20 11‡	175	tons. 201	tons. 191 6



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# Commonwealth Conversion and Redemption Loan

#### INTEREST\_

6 Per Cent. for 2 years.

 $5\frac{3}{4}$  Per Cent. for 10 years. Price of Issue—Par.

 $5\frac{1}{2}$  Per Cent. for 20 years.

#### CONVERSION OFFER.

Persons holding Stock or Bonds in the 6 per cent. Commonwealth Loan maturing on 15th December, 1930, are invited to convert into a new Loan.

Such persons may either convert into a 6 per cent. Loan maturing on 15th December, 1932; or into a  $5\frac{3}{4}$  per cent. Loan maturing on 15th December, 1940; or into a  $5\frac{1}{2}$  per cent. Loan maturing on 15th December, 1950.

#### CASH SUBSCRIPTIONS.

Cash subscriptions are invited to this new Loan, and will be interest bearing from date of lodgment.

Subscriptions may either be made to a 6 per cent. Loan maturing on 15th December, 1932; or a  $5\frac{3}{4}$  per cent. Loan maturing on 15th December, 1940; or a  $5\frac{1}{2}$  per cent. Loan maturing on 15th December, 1950.

Interest, which will be FREE OF STATE INCOME TAX, will be paid on 15th June and 15th December in each year.

Applications may be lodged at any Bank, Savings Bank, Money Order Post Office, or with any member of a recognised Stock Exchange.

J. A. LYONS,

Acting Treasurer.

COMMONWEALTH TREASURY.

#### Other Points of Interest.

Mr. B. Holz, of Mitchell's Flat, carried out a trial to determine the effect which the previous crop had on the subsequent sorghum crop. Sorghum following velvet beans outyielded by  $3\frac{1}{2}$  tons per acre sorghum following sorghum, while sorghum after velvet beans was freer from red stain fungus.

The presence of weeds and the setting of the surface soil were responsible for low yields at some centres. In one of the maize trials these factors, combined with the poor water-holding capacity of the particular soil, resulted in complete failure.

These trials also brought to light an interesting fact regarding the water-holding capacity of the alluvial soils on which the trials were sown. In no less than nine instances crops growing on these soils showed signs of distress due to want of moisture within a few weeks of sowing, notwith-standing that from 4 to 31 inches of rain had fallen on the fallow. It is concluded that these soils lack the ability to hold the absorbed moisture at such a depth as to be within range of maize and sorghum roots.

#### AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

#### 1981.

Albion Park (H. H. Beattle) Kiama (G. A. Somerville) Berry (G. Gillam) Wollongong (W. J. Cotchrane) Liverpool (B. C. Fitzpatrick) Leeton (W. Rosewarn) Nowra (H. Rauch) Castle Hill (E. Black) Newcastle (P. Legoe) Milton (Rev. S. A. Turner) Kangaroo Valley (L. W. Vance) Granville (B. Hyslop) Mattland (M. A. Brown) Blacktown (A. J. Greenaway) Robertson (W. G. Jenkin Taralga (W. N. Fitzgibbons) Braidwood (H. E. Roberts) Bellingen (J. F. Reynolds)	Feb	6, 7 11 12, 13, 14 13, 14 18 to 21 18, 19 20, 21 20, 21 20, 21 27, 28 27, 28 3, 4 4, 5	Mudgee (T. P. Gallagher)   Mar. 10, 11, 12
	37	4, 5 4, 5 5, 6, 7 6, 7	

#### TETANUS, MALIGNANT OEDEMA AND CASEOUS LYMPHADENITIS

Tetanus, malignant oedema and caseous lymphadenitis are wound infectious. They can be very largely prevented by attention to the details of cleanliness. Any Veterinary Officer or Stock Inspector of the Department of Agriculture will willingly advise stockowners regarding the necessary measures of prevention. Shearing sheds throughout the country are being visited by Inspectors for this purpose.—Max Henry, Chief Veterinary Surgeon.

### Seed Maize Contests, 1929-30.

#### LOWER NORTH COAST.

J. M. PITT, H.D.A., Senior Agricultural Instructor.

SEED MAIZE contests were again carried out during the past season in the Macleay, Manning and Upper Manning districts. Interest in these competitions and the scope of the entries were limited as a result of the disastrous floods of February, 1929. It will be many years before the high standard of pre-flood days is again attained, but there is nothing can raise the maize standard quicker than these competitions, which aim at ascertaining the sources of the highest-yielding strains of the most suitable varieties. Keen interest should therefore be maintained at the present time.

#### The Season.

The winter months were wet throughout and frosts were experienced during September and October. On the Macleay heavy rain caused floodings in the spring and cold damp weather was experienced on the Manning, where, on several occasions, the thermometer readings were in the forties. The summer months were dry, although on the Upper Macleay a useful thunderstorm occurred. Less than an inch of rain was recorded in both December and January, but after mid-February the dry conditions were broken, the remainder of the season being much too damp.

#### The Manning River Contest.

This was the tenth annual contest conducted by the Manning River District Agricultural Society. Two handsome cups were presented by the President, Mr. G. T. Clarke, and the Secretary, Mr. Chas. Jackson, for competition. The entries, which numbered twenty-four, seventeen being from local growers, were sown on four different farms—two at Mondrook on the properties of Messrs. R. Richardson and A. C. McLeod, and one on the Taree Estate (Mr. J. P. Davis). The fourth plot, at Moto, had to be abandoned owing to the effects of a dry spring and the damage done by cutworms.

Mr. J. E. Hammond's strain of Fitzroy with which he won the competition was not only superior in yield, but was conspicuously outstanding in growth. It originally came from a well-known local grower and has lost none of its yielding capabilities in its new owner's hands.

Of the first ten places, seven were filled by Fitzroy and Large Red Hogan, and it should be of interest to growers to note that in the nine contests to date Fitzroy has won four, Large Red Hogan three and Pride of Hawkesbury three. Large Red Hogan has not been grown quite as extensively as it might, especially on the richer soils, chiefly because the earlier strains became badly infested with cob-rot. This has to a large extent been over-

come by selecting the smoother-grained type now recognised as better able to resist diseases. Fitzroy has certainly become very popular, being reliable and possessing grain of good quality and colour. From the table of results it will be seen, however, that not all strains of this variety are outstanding. It is the high-yielding strains only that are sought after by the progressive grower.

This year's highest average yield of 98 bushels 54 lb. is the second lowest of the series, the very dry spring being responsible. The record for the series is 141 bushels 12 lb. by Pride of Hawkesbury in 1927-28. The highest average plot yield (94 bushels 37 lb.) this year also compares very unfavourably with the record average of 133 bushels 51 lb. in 1926-27.

TABLE of Yields-Manning River Contest.

Competitor.         Variety.         (Mr R. Richardson).         (Mr A. C. McLeod).         (Mr. J. P. Davis).           J. E. Hammond          Fitzroy          83         9         100         41         113         2           G. E. Levick          Large Red Hogan          79         53         98         22         107         25           J. W. Booth          Yellow Hogan          77         34         98         17         107         25           Department of Agriculture.         E. H. Ducat          Fitzroy          84         7         100         41         91         29           R. Richardson          Golden Beauty          79         45         96         3         95         10           Department of Agriculture.          Fitzroy          84         7         100         41         91         29         40         29         55         92         51         96         3         95         10         10         44         99         40         40         40         44         40         40         40 <th>Average Yield of the Three</th> <th> i</th> <th>1</th> <th></th> <th></th> <th>1</th> <th></th>	Average Yield of the Three	i	1			1	
Color   Colo		Estate Plot.	Plots.	Mondrook		Competitor.	
J. E. Hammond        Fitzroy        83       9       100       41       113       2         G. E. Levick        Large Red Hogan        79       53       98       22       107       25         J. W. Booth        Yellow Hogan        77       34       98       17       107       25         Department of Agriculture.       E. H. Ducat        Fitzroy        84       7       100       41       91       29         J. P. Mooney        Fitzroy        84       7       95       55       92       51         R. Richardson        Golden Beauty        79       45       96       3       95       10         Ulmarra Whitecap        75       31       94       8       99       40         Uculture.       Fitzroy        80       30       89       34       94       3         J. G. Stitt        Large Red Hogan        79       4       84       7       96       52         C. Drury        Manning Silvermine	Plots.			Richard-	Variety.		
F. Flett        Manning Silvermine       77 26       78 10       100 48         R. Richardson        Large Red Hogan       80 30       72 51       98 17         Department of Agriculture.       Leaming        76 17       92 5       83 9         J. P. Davis        Fitzroy        81 6       86 44       81 39         J. P. Davis        Pride of Hawkesbury       79 36       74 13       93 7         J. P. Davis        Hickory King       82 24       74 18       86 42         D. Dorward        Fitzroy        69 31       75 47       91 29         J. G. Stitt        Early Clarence       67 3       76 4       74 38         C. Shields        Leaming        57 6       67 20       88 33         Average Plot Yield       76 38       87 10       94 37	bus. lb. 98 54 95 15 94 24 93 26 92 7 91 0 90 19 89 45 88 3 86 39 86 35 86 18 85 46 85 43 85 27 83 51 83 47 83 39 88 11 82 18 81 9 78 54 72 37 71 1	113 2 107 25 107 25 108 44 91 29 92 51 95 10 99 40 94 3 96 52 94 3 90 27 98 17 100 46 98 17 83 9 94 2 81 39 93 7 86 42 91 29 74 38 88 33	100 41 98 22 98 17 91 4 100 41 95 55 96 3 94 8 89 34 84 7 89 30 87 23 89 34 82 41 78 10 72 51 92 5 93 31 84 74 13 74 18 75 47 76 4 67 20	83 9 79 53 77 34 80 30 84 7 784 7 79 45 75 31 80 30 79 4 76 16 81 6 69 31 74 13 77 26 80 30 76 17 63 30 76 17 63 30 82 24 69 31 67 3 82 57 6	Large Red Hogan Yellow Hogan Yellow Hogan Large Red Hogan Fitzroy Golden Beauty Ulmarra Whitecap Fitzroy Large Red Hogan Large Red Hogan Fitzroy Manning Silvermine Pride of Hawkesbury Large Red Hogan Fitzroy Manning Silvermine Large Red Hogan Leaming Manning Silvermine Fitzroy Pride of Hawkesbury Hickory King Fitzroy Early Clarence Early Clarence	f Agri-	G. E. Levick J. W. Booth Department of culture. E. H. Ducat J. P. Mooney R. Richardson Department of culture. F. Flett J. G. Stitt C. Drury C. Shields C. Drury J. G. Stitt F. Flett R. Richardson Department of culture. S. E. Everinghe J. P. Davis J. G. Stitt J. P. Davis D. Dorward J. G. Stitt J. G. Stitt J. G. Stitt J. P. Davis D. Dorward J. G. Stitt J. G. Stitt J. G. Stitt J. G. Stitt J. P. Davis D. Dorward J. G. Stitt J. G. Stitt J. G. Stitt J. G. Stitt J. P. Davis D. Dorward J. G. Stitt

The Macleay Contest.

This was the ninth annual contest conducted by the Macleay Agricultural Society. There were twenty entries, half of which came from local growers and up-river farmers. Two plots were selected for the contest, one on Mr. E. H. Ducat's farm at Temagog and the other on Mr. E. Booth's property at Austral Eden.

All previous records were shattered in this contest. The highest average yield (131 bushels 16 lb.) was secured by Ulmarra Whitecap, a non-competitive entry by the Department of Agriculture, the seed originally coming from a grower in the Ulmarra district. No fewer than ten entries finished ahead of the previous best average—119 bushels 13 lb., in the 1926-27 contest. Ulmarra Whitecap is a late-maturing variety and does well in the Macleay district. It is not grown there extensively, however, possibly because its pale-coloured grain gives it the appearance of having been inoculated. Palecap Horsetooth, a somewhat similar variety, won the 1924-25 contest.

Fitzroy, the winning local entry, is the most extensively grown variety on the central coast. The yield of 139 bushels 45 lb. is a record for the Mucleay district in these tests, the previous best being 137 bushels 52 lb. by the same variety as far back as 1923-24. Fitzroy shares with Yellow Hogan (an excellent local variety) the distinction of three wins each in the series. Further, Fitzroy secured four out of the first ten places, and Large Red Hogan and Pride of Hawkesbury two each.

Mr. E. H. Ducat, the owner of the winning competitive entry, also scored for the highest plot yield, and in addition carried off the cup for the Royal Agricultural Society's Field Maize Competition for the Lower North Coast.

The average plot yield of 123 bushels 49 lb. per acre is also a record, the previous best being 110 bushels 35 lb. in the 1923-24 contest. The old record was also beaten by the average (112 bushels 38 lb.) on Mr. E. Booth's plot at Austral Eden.

TABLE of Yields-Macleay Contest.

LAI	SLE OI I leids—Maciea,	y Contest.		
Competitor.	Variety	Temagog Plot (Mr E H. Ducat).	Austral Eden Plot (M1 II Booth)	Averige of the Two Plots.
Department of Agriculture E. H. Ducat J. P. Mooney E. H. Ducat Department of Agriculture Colin Smith H. H. Booth Department of Agriculture Colin Smith R. Richardson J. W. Booth Department of Agriculture R. Kesby Skimmings and Booth J. Laney Mrs. Shaw E. Booth H. Booth Department of Agriculture W. J. Seargent	Fitzroy Fitzroy Fitzroy Pride of Hawkesbury Large Red Hogan Leaming Fitzroy Pride of Hawkesbury (J. G. Stitt). Large Red Hogan Large Red Hogan Large Red Hogan Fitzroy Giant White Golden Beauty Yellow Hogan Silvermine Yellow Hogan Yellow Hogan Yellow Hogan Yellow Hogan Leaming	130 18 119 18 134 0 126 38 123 0 130 18 125 27 117 8 119 18 106 45	bus. lb. 132 53 116 28 130 15 119 18 121 24 119 10 117 38 121 38 110 12 119 27 102 28 109 5 110 52 103 21 102 28 106 45 111 0 98 17 102 11 98 8 112 38	bus. lb. 131 16 128 8 127 12 127 9 124 35 123 3 121 18 120 28 120 15 119 22 118 14 117 50 116 54 116 47 113 55 111 54 109 4 108 40 104 28 104 25

#### Mount George Agricultural Bureau Contest.

This was the sixth contest promoted by the Mount George Agricultural Bureau. There were twenty-four entries, which were again sown on Mr. Shields' farm, Somerset.

TABLE of Yields-Mount George Contest.

Competitor.	Varirty.	Yield.					
Alex. Andrews C. Keppie Mrs. N. Shaw C. Shields Department of Agriculture C. Shields C. Stone A. H. Norris Department of Agriculture J. C. Duff Duff and Andrews F. Flett C. Shields J. C. Duff F. Smith Department of Agriculture J. Booth J. G. Stitt Alex. Andrews J. C. Duff C. Shields J. C. Duff C. Shields J. G. Stitt Alex. Andrews J. C. Duff C. Shields J. C. Duff C. Shields J. C. Stitt J. P. Davis J. G. Stitt Department of Agriculture			Manning Pride Fitzroy  Manning Silvermine Pride of Hawkesbury Ulmarra Whitecap Fitzroy  Leaming Fitzroy  Manning Silvermine Leaming Manning Silvermine Leaming Fitzroy  Pride of Hawkesbury Fitzroy  Fitzroy  Fitzroy  Fitzroy  Fitzroy  Pride of Hawkesbury			bus. 105 103 95 93 92 89 89 87 87 86 85 85 85 84 84 84 83 83 82 82 81	1b. 24 54 10 45 40 11 26 18 18 48 46 22 21 0 0 0 48

Mr. Alex. Andrews' winning entry of Manning Pride suits the district admirably and with careful seed selection would more than hold its own with any other variety on the medium to light soils. It is, in addition, a clean variety to handle and is attractive and mostly disease free. Fitzroy again did well, filling four out of the first nine places. Both the highest yield and the average plot yield have been exceeded before.

#### Golden Superb Contest.

The samples of seed sown in this contest were not only few but were inferior to the standard reached prior to the floods of 1929. Careful selection of the earlier-maturing types, the elimination of any crosses with Leaming, one or two of which were noticeable in this year's contest, and the planting of high-yielding strains are factors which will help regain the high standard previously attained.

There were eight entries, mostly from up-river farmers, and they were planted on two plots, one with Mr. John Booth, at Temagog, and the other with that farmer's brother, at Austral Eden.

Competitor.		Yield at Temagog.			Yield at Austral Eden.		Average Yield of the Two Plots.			
H. Booth McMahon and SI E. H. Ducat M. Booth J. W. Booth R. Kesby F. Parish E. Booth C. Smith Average P		bus. 127 122 110 120 116 113 97 107 100	lb. 31 7 28 18 28 14 0 7 42	bus. 95 98 99 85 88 90 87 76 72	lb. 32 32 42 0 7 14 50 28 21	bus. 111 110 105 102 102 101 92 91 86	lb. 31 19 7 37 17 42 25 45 31	(not eligible)		

Although Mr. H. Booth's entry finished first on both plots, it was distinctly Leaming in type and under the circumstances was considered ineligible. Messrs. McMahon and Skimming's entry yielded 122 bushels 7 lb. and was the best of the remainder, being a fairly good type of early maturity and quite up to standard.

#### Selected Citrus Buds.

THE CO-OPERATIVE BUD SELECTION SOCIETY, LTD.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with the view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the ægis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best types of quality fruit and of reputed good bearing habits only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society, Ltd., supplied the following selected orange buds to nurserymen during the 1930 budding season, trees from which should be available for planting during the 1931 planting season:—

				Buds of	Buds of
			Was	hington Navel.	Late Valencia.
T. Adamson, Ermington		•••	•••	3,000	3.000
W. Beck, Epping	•••	•••	•••	1,000	1,000
A. T. Eyles, Rydalmere	•••	•••	***	3,000	2,000
J. de Freitas, Fairfield	***	•••	•••	200	200
R. Hughes, Ermington	•••		•••	1.000	1.000
L. P. Rosen and Son, Carlingfo	ord	•••	•••	5.000	1,200
B. E. Yarnall, Ourimbah	•••	***	•••	100	100

<sup>-</sup>C. G. SAVAGE, Director of Fruit Culture.

#### Farm Forestry.

### V. THE NATIVE AND INTRODUCED TREES OF NEW SOUTH WALES.

[Continued from page 700.]

R. H. ANDERSON, B.Sc., Agr., Assistant Bouanist, Botanic Gardens, Sydney, and Lecturer in Forestry, University of Sydney.

### THE COASTAL DIVISION—continued. Native Trees of the Coastal Division—continued.

Flindersia spp.

This group of trees includes the following important species:—Teak (Flindersia australis), Cudgerie (Flindersia Schottiana), Bennett's Ash (Flindersia Bennettiana), Yellow Wood (Flindersia Oxleyana), and Flindersia collina.

Botanically the species are characterised by having pinnate leaves which are more or less marked by transparent dots, rather small flowers in fairly large panicles, and by large capsules which separate into five boat-shaped, rough backed valves containing winged seeds. Teak differs from the allied species in that it has the overlapped part of the cone valves very rough, whereas that of the other species is always smooth. Bennett's Ash is distinguished by the large, thick, shiny leaflets. Cudgerie has sessile leaflets, or nearly so, with a broad oblique base. The leaflet in Yellow Wood is narrowed into a short but distinct petiole. The seed of Cudgerie and Yellow Wood is winged at both ends, whereas that of Teak and Bennett's Ash is winged at one end only. In Flindersia collina the stalk of the leaves is more or less dilated to form a wing, and the capsules are much smaller than those of the other species.

Teak (Flindersia australis) occurs as a large tree up to 130 feet in height in brush forests from the Richmond River northwards. The bark is usually rough or scaly and brown in colour, or occasionally yellowish. The flowers are small, white and with a brown centre.

The yellowish-brown, close grained timber is heavy and strong and useful for general building purposes. It is rather greasy and therefore in demand for dance-hall floors, but is rather difficult to work. It is fairly durable in the ground, being used for fencing where eucalypts are not plentiful. The tree is a very handsome and ornamental species and worthy of planting for shelter and beautification in good soils where the rainfall is fairly high.

Cudgerie (Flindersia Schottiana) is also known as Bumpy Ash owing to the presence of fairly large protuberances along the stem. It occurs as a large tree with a greyish, fairly smooth bark in brush country from the Hastings River northwards.



Teak (Flindersia australis).

The pale-coloured timber is lighter and more easily worked than Teak and is a useful building timber. It has also been successfully used for rails, shingles and sporting goods. It is sometimes apt to season irregularly, but is a very useful timber. The tree is of ornamental appearance.

Bennett's Ash (Flindersia Bennettiana) is found as a fairly large tree with rather smooth bark in rich brush lands from the Clarence River northwards. It also occurs on the sandy soils of Frazer Island.

The timber is moderately light and easily worked, but is seldom used. The species is an ornamental one and is a good avenue tree, having handsome glossy leaves and large masses of small white flowers.

Yellow Wood (Flindersia Oxleyana) occurs as a large, more or less smooth-barked tree with a long clean stem in brush land from the Richmond River northwards. Owing to its habit of growth it is also known as Long Jack.

The pale yellow timber is a good bending and carving timber and fairly strong, being used for tool handles, barrels, joinery and sometimes for cabinet work.

Flindersia collina has a limited range, being practically confined to the Tooloom Ranges in the extreme north of the State. It occurs as a fairly large tree with a hard, pale yellow timber resembling that of Teak, and only slightly inferior.

#### Brush Wilga (Geijera salicifolia).

A small to medium-sized tree with rather scaly dark grey or brown bark, found fairly commonly in brush country from the Illawarra district to Queensland.

"Leaves alternate, 3 to 4 inches long, narrow to oval in shape; flowers small, in panicles; fruit about \( \frac{1}{2} \) inch diameter, containing a single black seed."

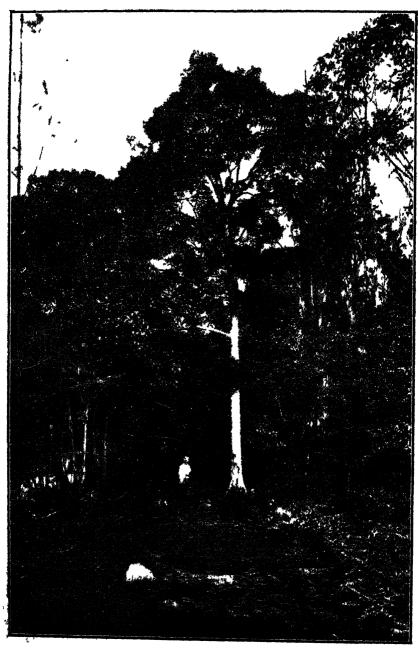
Uses.—This species forms a handsome densely foliaged tree and is suited for shade and ornamental purposes. The small white flowers are borne in profusion. The timber is pale yellow, rather heavy, close grained and tough to cut with the axe.

An allied species, Geijera Muelleri, is found in a few localities in the northern part of the Division, chiefly in the Lismore district.

Other tree species belonging to the same botanical family (Rutaceae) as the Flindersias and the abovementioned species include the following:—

Thorny Yellowwood (Xanthoxylum brachyacanthum), a small tree with light grey bark armed with conical prickles. It is found in brushes from the Clarence River northwards, and has a bright yellow close-grained wood.

Ghittoe (Halfordia drupifera) is found as a medium sized tree in brush lands, but also occurs as a small tree or shrub in exposed situations on sandy soil near the sea. It has a bluish black fruit about ½ inch long and alternate simple leaves. The pale coloured rather heavy timber is tough and flexible.



Red Cedar (Cedrela australes).

The genus Acronychia includes five species found in the Coastal Division, the most common being Acronychia laevis. This occurs fairly commonly as a small tree in brush lands and more open forests close to the sea. It has opposite leaves and a fleshy white or yellowish fruit.

The Native Finger Lime (Citrus australasica) is found as a shrub or small tree from the Clarence River northwards. It has spines in the axils of the leaves and usually an elongated fruit up to 3½ inches long with a more or less lemon-like flavour.

Two species of *Bosisto*, three species of *Evodia* and two species of *Melicope* are found in the northern subdivision. These are mainly small trees of no particular importance.

Medicosma Cunninghamii, sometimes known as "Bonewood," is found in a few localities northwards from the Clarence River. It is a small tree with opposite leaves and large flowers.

#### RED CEDAR (Cedrela australis).

A large deciduous tree with an open, wide, spreading crown and a grey or brown scaly bark. It occurs as scattered individuals or small groups in the brush areas from Milton northwards to Queensland and is most abundant in moist gullies or along streams, requiring for its best development volcanic soils with a good rainfall. It is one of the very few deciduous native trees.

"Leaves pinnate, with 6 to 8 pairs of leaflets. Flowers small, fragrant, in a large terminal panicle. Fruit a dry capsule, oval, about 1 inch long and containing winged seeds."

Uses.—It is a fine ornamental tree and useful for shade and shelter purposes where a deciduous tree is required. The light, easily worked, reddish timber is beautiful for cabinet purposes and general indoor work, and has always been highly valued.

The tree is fairly easily propagated from seed, and may also be raised from cuttings. The seed, however, must be fairly fresh in order to get good germination. The shoots, leaders, and seeds are attacked by the cedar twig borer, which causes a good deal of damage, making the formation of cedar plantations on a large scale a rather insecure project.

#### WHITE CEDAR (Melia Azedarach var. australasica).

A large deciduous tree with fairly dark, more or less furrowed, bark found in brushes usually on good soil from the Illawarra district northwards to Queensland.

"Leaves twice pinnate, the leaflets more or less toothed. Flowers lilaccoloured and fragrant, in loose panicles, the stamens united in a tube. Fruit a nearly globular or oval, pale-coloured drupe."

Uses.—This species is a useful ornamental and shade tree, being especially suited where a deciduous tree is required. It is hardy and drought resistant doing quite well under dry western conditions. The fruits are poisonous



White Gedar (Melia azedarach) Growing in Natural Habitat in Brush Forest. Compare with the other illustration of White Cedar.

to pigs, but the tree is freely planted for shade in poultry runs without any harmful effects. The pale brown, open grained timber is rather attractively figured and may be used for cabinet work. It is light in weight, easily dressed, and can be employed for many softwood purposes, including indoor joinery. The bark was said to be used by the blacks as a fish poison.

The species is easily propagated from seed and is fairly rapid in growth.



White Gedar (Melia azedarach) Grown as a Shade and Shelter Tree.

Compare with the other illustration of White Cedar.

Rosewood (Dysoxylum Fraserianum).

A medium- to large-sized tree up to 140 feet in height with a grey or yellowish scaly bark, found fairly commonly in brush forests from Wyong northwards.

"Leaves alternate, pinnate, with five to ten elliptical leaflets. Flowers small, in panicles, sweet-scented, the filaments united in a tube. Fruit a globular or pear-shaped capsule,  $\frac{3}{4}$  inch to  $1\frac{1}{2}$  inches diameter, containing large red seeds."

Uses.—The timber is red, fairly light in weight, easily worked and said to be very durable, resisting both dampness and white ants, and can be used for a variety of purposes. It is ornamental and is sometimes used for cabinet and decorative work and for turnery. It has a pleasant rose-like

odour and was once used for making ottar of roses. The tree is very attractive as an ornamental and shade tree, doing best on good, rather moist soils, but does quite well on poorer soils. A good specimen is growing on the poor soil of the Sydney Botanic Gardens.

#### RED BEAN (Dysoxylum Muelleri).

A medium- to large-sized tree, with a dark yellowish flaky bark, found in the northern brush forests. It is also sometimes known as "Pencil Cedar" or "Turnip Wood," the latter name referring to the strong turnip-like odour of the freshly-cut bark and sapwood.

"Leaves pinnate, with eleven to twenty-one leaflets. Flowers small, in panicles, the filaments united into a tube which is hairy outside. Fruit a somewhat roughened capsule about 1 inch diameter."

Uses.—The timber may be described as a scentless Rosewood. It is easy to work, has a rather decorative figure, and may be used for decorative and cabinet work. The tree is useful for ornamental and shade purposes.

Other species of Dysoxylum found in the Coastal Division are Dysoxylum rufum and Dysoxylum Becklerianum.

Dysoxylum rufum is often known as "Bastard Pencil Cedar" and is found fairly commonly in the northern subdivision in brush lands. It forms a medium- to large-sized tree with rather smooth greyish bark and is distinguished by the young branches, undersides of the leave and the fairly large capsule being densely rusty-hairy. The timber is pale-coloured, fissile, and fairly light in weight, but is seldom used.

Dysoxylum Becklerianum is a rare tree which so far has only been found in the Clarence River district.

Another fairly closely allied species is Amoora nitidula, sometimes known as Bog Onion or Incense Wood. It occurs as a medium-sized tree with grey bark in brushes of the northern subdivision. The leaves are pinnate with two to six smooth shining leaflets. The fruits are brown, pear-shaped capsules containing bright red seeds. The timber is yellowish to pale coloured, with a somewhat similar perfume to Rosewood, and should be a useful timber of its class.

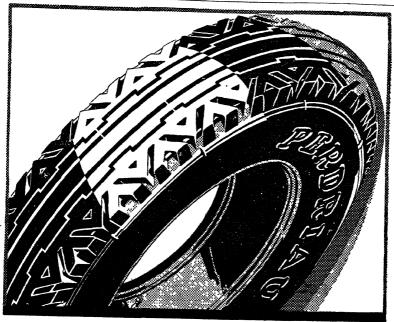
Onionwood (Owenia cepiodora) occurs as a medium-sized tree occasionally reaching 100 feet in height in brush lands northwards from the Clarence River. It has a moderately useful timber of the cedar class, which is sometimes sold as Bastard Cedar. The wood has an onion-like smell which soon passes off, and the foliage also sometimes has a garlic odour.

#### BASTARD ROSEWOOD (Synoum glandulosum).

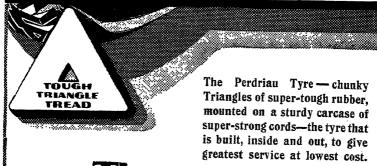
A small to medium-sized tree with brown scalv bark, often reduced in size to a tall shrub, found commonly in all three coastal subdivisions, usually in brush lands, but also on poorer sandy soils near the sea.

I. F. Leaves alternate, pinnate with seven or eleven leaflets, marked by gland-

the buffs of bairs on the underside where the lateral veins meet the midrib.



## Toughness



## Perdriau

8.MO Tyre

STURDY AUSTRALIAN

PROBUCT OF DUNLOP PERDRIAL

Department of Agriculture, New South Wales.

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First session commences on or about 21st January each year.

FEES: £16:10:0 per session, covering board and lodging, tuition, medical, dispensing, and sports fees.

A liberal number of scholarships and bursaries is available.

Write for further particulars, prospectus, and application forms to

The Principal, or The Under Secretary,
Hawkesbury Agricultural College,
Richmond.

Department of Agriculture,
Sydney.

Uses.—The red timber is somewhat similar in appearance to Rosewood, but lacks the sweet odour of the latter. It could be used for indoor fittings and cabinet work, but is generally obtainable in small logs only, and the larger trees are often crooked and irregular.

#### Brush Bloodwood (Baloghia lucida).

A small to medium-sized tree with grey bark from which blood-red sap exudes when cut. It occurs in brush forests in both central and northern subdivisions.

"Leaves opposite, oval, thick, shining, 2 inches to 5 inches long. Flowers white or cream-coloured, fairly large, few together, the males ad females usually on separate branches. Fruit a three-lobed capsule about \frac{2}{4}-inch diameter."

Uses.—The timber is pale to light reddish-brown in colour and has little figure, but contains some resinous matter and burns readily even in the green state. Cattle are said to eat the leaves to some extent. It is fairly readily propagated from seed and is worthy of cultivation for shade and ornamental purposes.

#### CHEESE TREE (Phyllanthus Ferdinandi).

A small to medium-sized tree of spreading habit, up to 70 feet in height, found fairly commonly in the central and northern subdivisions, both in brushes and more open forests. The vernacular name alludes to the flat circular fruits, but the tree is also known as Pencil Cedar.

"Leaves alternate, simple but often appearing to be pinnate. Flowers small, male clustered, females solitary. Fruit circular, flattened and fluted, inch to \(\frac{3}{4}\) inch diameter."

Uses.—The timber is soft, red, fairly close grained and easy to work, but is rarely used for any purpose.

In addition to the above species, the family Euphorbiaceae contains a number of trees and larger shrubs which are found in the Coastal Division, including the following:—

Glochidion Ferdinandi, a small- to medium-sized tree with grey bark, found from the Illawarra northwards.

Hemicyclia australasica, sometimes known as Yellow Tulip, a mediumsized tree found from Port Macquarie northwards.

Bridelia exaltata, a medium- to large-sized tree with a dark-brown prominently-furrowed bark, giving the species the vernacular name of "Brush Ironbark." It has alternate leaves with prominent veins and a small, globular, yellowish, rather fleshy fruit. The leaves are said to contain a prussic acid yielding glucoside, and may therefore cause poisoning to stock if eaten in quantity.

Five species of *Croton* are found in various localities. These are small trees or shrubs of little importance.

The Native Poplar (Homalanthus populifolius) occurs as a shrub or small bushy tree throughout the division. It is also known as Bulli Poison Bush, and was for a long time regarded as having a bad effect on stock. Experiments, however, have shown it to be harmless. It forms a pretty shrub, the older leaves turning crimson or variously tinted. It is also known as Native Bleeding Heart.

Excaecaria Dallachyana, sometimes known as Brush Poison Tree, is found northwards from the Richmond River. It is a small to medium-sized tree with a milky juice which is said to irritate the eyes if touched.

#### DEEP YELLOW-WOOD (Rhodosphaera rhodanthema).

A medium-sized tree up to 70 feet in height, with a rough, scaly, grey or brownish bark, found in brushes in the northern subdivision.

"Leaves pinnate, with three to five pairs of leaflets. Flowers red, in large panicles. Fruit globular, dry, brown and shining, about ½ inch diameter."

Uses.—Timber pale yellow and of possible use for decorative purposes. The tree is a very ornamental one, having attractive foliage and berries, and is worthy of cultivation as such.

#### BLUSH CUDGERIE (Euroschinus falcatus).

A medium- to large-sized tree with a brown-coloured, somewhat wrinkled bark found in brushes of the northern subdivision. It is also known as Maiden's Blush and Ribbonwood.

"Leaves pinnate, four to ten leaflets. Flowers small, in large panicles. Fruit about ‡ inch long, egg-shaped and single-seeded."

Uses.—This tree is sometimes cultivated as an ornamental and shade tree. The timber is said to be suitable for indoor work and for cabinet purposes.

#### RED-FRUITED OLIVE PLUM (Elacodendron australe).

A shrub or small tree found fairly widely from Kiama northwards both on the coastal ranges and in areas close to the sea. It is most common on the fringe of brushes.

"Leaves opposite, shallowly toothed. Flowers small, in slender cymes. Fruit oval, succulent on the outside and bright red in colour, ½ to ¾ inch long."

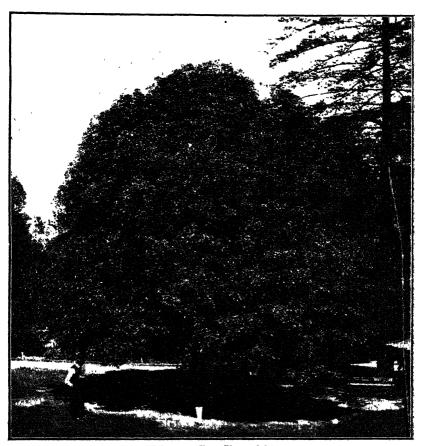
Uses.—Some specimens, especially if shrubby, are ornamental, the red berries being attractive. The timber is too small for most purposes.

#### IVORYWOOD (Siphonodon australe).

A medium to tall tree up to 130 feet in height and usually slender in habit. The bark is usually furrowed or wrinkled, and brownish-grey in solour. It occurs in brushes in the northern subdivision and is sometimes the beauty of the second as Native Guava.

"Leaves alternate, 2 to 3 inches long, entire, shining above, paler underneath. Flowers few, lemon coloured, sweetly perfumed, about ½ inch diameter. Fruit globular to pear-shaped, bright yellow, 1 inch to 2 inches diameter."

Uses.—The close-grained pale-coloured timber should be of use for general indoor work, but it is little exploited at present.



Tulipwood (Harpullia pendula).

#### CHURNWOOD (Villaresia Moorei).

A medium to large-sized tree with a grey corky bark found in scattered localities in branches from Shoalhaven River northwards. It is also known as Soap-wood or Soap Box.

"Leaves alternate, glossy and rather thick. Flowers small, in panicles. Fruit oval or globular, about 1 inch long, black, the outer part soft."

Uses.—The timber is pale-coloured, rather light in weight and may be used for box-making or indoor work.

The botanically related species Pennantia Cunninghamii is also found in coastal brushes from the Illawarra district northwards, often near running water. It has fairly large leaves and an egg-shaped berry about ½ inch long, and makes a nice ornamental tree.

#### NATIVE TAMARIND (Diploglottis Cunninghamii).

A small to large-sized tree with grey or brownish bark found in the coastal brushes of the central and northern subdivisions.

"Leaves very large, pinnate, consisting of eight to twelve large leaflets, the leaflets up to 10 inches long. Flowers in large panicles in the forks of leaves. Fruit a yellow two to three lobed, fleshy capsule, the seeds covered with orange-red pulp."

Uses.—The fruits are sharply but pleasantly acidulous and are used to some little extent for jam-making. The timber is seldom used, although possibly suitable for general indoor work.

The closely related species, Diploglottis Campbelli, is found in the Tweed River district.

#### TULIPWOOD (Harpullia pendula).

A medium sized tree with greyish bark, found in the northern subdivision in brush lands.

"Leaves pinnate, with three to six thin leaflets, the leaflets 3 to 5 inches long. Flowers in loose, slender, terminal panicles. Fruit a smooth, deeply two-lobed capsule, yellow or reddish in colour, containing large dark seeds."

Uses.—This species forms a very attractive shade and ornamental tree. and is well worth planting out on moderately good soils in the Coastal Division. The timber is close grained, hard and heavy, but is fairly easily worked and has an attractive figure produced by a dark-brown colouring streaked with paler portions. It is especially suited for cabinet work.

(To be continued.)

#### "KNOW YOUR OWN WEATHER."

In a country where rainfall is the limiting factor in production in almost every district, an understanding of the fundamental principles governing weather conditions should be part of the equipment of every farmer and pastoralist. Most men on the land, because of a never ending battle with the elements, have acquired the ability to foretell with more or less accuracy impending weather changes. With an understanding of the underlying principles—at present these men are guided by experience only—their forecasts would naturally become more reliable. Perhaps no better teacher could be found to impart that knowledge than Mr. D. J. Mares, New South Wales Government Meteorologist, and he has done so in a most readable manner in his recently issued book, Know Your Own Weather. This book should also prove of special value to the teaching profession and students.

Our copy from the publishers, Messrs. Angus and Robertson, Ltd., Sydney.

The price of the book is 5s.

## Time Saving in Testing Butter for Moisture Content.

R. C. HOTTES and F. A. VERNON, Assistant Dairy Instructors.

Two principal factors render it necessary for more attention to be paid to the testing of butter for moisture content. They are:—

- 1. Economic reasons, which include standardisation.
- 2. The new regulations under the Commerce Act require that the moisture content of each churn must be shown on the boxes.

Factory procedure, especially where the output is large, precludes the adoption of the standard laboratory method of carrying out this work, principally on account of the length of time required in its application. Therefore, it becomes essential for practical purposes to substitute a method, the main features of which combine time saving with a maximum degree of accuracy under the existing circumstances. Such a method is now being carried out by officers of the Dairy Branch at the Sydney distributing centre of the largest group of butter factories in the State, and has proved most satisfactory. The main features associated with this method are: (1) Working simultaneously with six or more dishes of exactly the same weight for holding the samples of butter; and (2) the use of an electric hotplate to drive off the moisture from the samples.

The first of these obviates the necessity for checking the weights of the empty dishes and also for any possible needed adjustment of the balance each time before the butter is first weighed. The hot-plate abovementioned consists of a round disc of iron about 8 inches in diameter, on which six aluminium dishes can be comfortably accommodated. This plate is heated by three degrees of electric power controlled from a switch. Each of these degrees of heat can, therefore, be availed of when necessary. This appliance enables the moisture from six samples to be expelled at the one time, and is a distinct improvement on the use of a single flame for expelling the moisture from each individual sample. Meanwhile the operator is enabled either to weigh off further samples if necessary or attend to other duties in the butter room.

Where no electric power is available investigations have shown that what is known as a hot sand bath constitutes a satisfactory substitute for the electric hot-plate. In the absence of the proper form of sand bath as used in chemical laboratories a sheet of iron covered with fine sand to the depth of, say, half to three-quarters of an inch, answers the purpose quite well. The heat may be applied by means of a primus stove. The dishes containing the butter are placed on the hot sand, which is heated to anything up to 300 deg. Fahr. The use of sand has the effect of distributing the heat more evenly over a surface than is the case where just the bare iron is used.

Trials made as to results obtained when the samples are shaken at intervals during the heating process as compared with when they are allowed to remain stationary on the plate, suggest very little if any difference as regards accuracy, but it is found that slightly more time is required to drive off the moisture when the dishes are not shaken.

Besides giving uniform results the methods discussed in this article are decidedly conducive to considerable time saving, and when combined with the cooling of the dishes before final weighing by immersing them in cold water and thoroughly drying them, they supply a most needed means of speeding up the work of testing butter for moisture at the factory.

#### HERD RECORDING AND LAND VALUES.

WHEREVER herd recording has been carried on continuously and systematically for a number of years, a considerable increase in the average yield of the herds recorded has resulted. This increase is estimated at about 10 lb. of butter a year for each cow. Suppose the herds in a district to have been under test for the past seven years, then the average aggregate increase for that period is 70 lb. butter-fat per cow, which at, say, 1s. 6d. per lb. equals £5 5s. per cow. If the carrying capacity is one cow to 2 acres, the productiveness of each acre of that land has been increased by £2 12s. 6d. a year. And this is only an indirect benefit of having your herds recorded. There are many more direct advantages to be gained from this practice, and they are even more profitable than the one outlined above. which extract is taken from the recently issued bulletin, Testing Milk and Cream and Recording Yields of Dairy Cows for Herd Improvement, by L. T. MacInnes, Director of Dairying, New South Wales Department of Agriculture. This booklet also contains a full discussion on the economic situation in the dairying industry, an outline of the organisation of herd' recording movement, and the technique of testing milk and cream by the Babcock method. Copies are obtainable either from the Department or from the Government Printer, Phillip-street, Sydney; price 1s. 2d. posted.

#### U.S.A. FOLLOWS IN OUR FOOTSTEPS

Because culled cows sold to the butcher often found their way back into dairy herds, the Whatcom County Dairy Herd Improvement Association, Washington, has adopted a plan for permanently removing these cows from milking herds. An car punch which cuts a diamond-shaped hole is used on the right ear of each cow culled from the herd. The matter of marking these cows is optional with the owner.

A system answering the same purpose has been in operation in New South Wales for some years. In our case, however, the cows are officially firebranded instead of earmarked. Not only the culls, but all recorded cows many be branded, and in this way the worth of any cow offered for sale can install be assessed by reference to her record sheet. Of course, if this is not fartheorems, the entired can be regarded as a cull.

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The sail .

## Curd Content of Butter and its Relation to Quality.

A. M. BROWN, Special Dairy Instructor and Senior Grader.\*

ONE of the provisions of the Dairy Industry Act renders it necessary to credit the dairy farmer each month with all butter manufactured from cream supplied by him to a butter factory, together with the amount of overrun. Other clauses of this Act have either directly or indirectly combined to assist materially in improving quality to such an extent that New South Wales butter has gradually reached such a high standard as to compare more than favourably with the best produced elsewhere in the world. These two factors constitute distinct advantages to the dairy farmer in this State, for he not only receives payment for the whole of the commercial butter manufactured from his cream, but, as the price received for this commodity is or should be governed principally by its quality, he also receives the maximum benefit due to this latter factor.

From a casual survey, it may be suggested that there are two general ways of enhancing these benefits, viz., (1) by increasing the amount of commercial butter obtained from cream supplied; and (2) by an even more general improvement in butter quality. The first of these has, however, an important bearing on the second.

#### Increasing the Amount of Commercial Butter Obtained from Cream.

The principal means of bringing this about is to increase the percentages of water and curd in our butter, and it must be admitted that, although faced with standards fixed by law, there are sufficient, if not wide, margins to enable this to be lawfully done. But if by doing so quality is adversely affected, any advantage gained on the one hand will be more than nullified by a greater disadvantage on the other. For instance, if the amount of commercial butter is increased by say 1 per cent. through the incorporation of more water, curd, and perhaps salt, and as a result the quality of the butter is thereby adversely affected to the extent of being classed as even first grade instead of choicest, with the corresponding difference in price of, say, \(\frac{1}{2}\)d. per lb., it can at once be seen that no economic benefit will accrue from altering present manufacturing methods in the manner indicated.

#### Excessive Curd in Butter and its Effect on Quality.

In New South Wales, almost from time immemorial the presence of an abnormal amount of curd in butter in the form of butter-milk has been considered a definite menace to quality, and this belief has been contributed to more and more of late years by a greater knowledge of the part that micro-organisms play in the changes which take place in butter and their effect on its keeping quality.

<sup>\*</sup> Paper read at the Conference of Dairy Factory Managers and Secretaries, Sydney, 1930

Bacteriologists have proved that casein, or otherwise curd, constitutes an ideal food for a great many types of harmful bacteria, and where these are present in sufficient numbers in butter, decomposition of the casein takes place, with a resultant detrimental effect on butter quality.

It is not possible under general factory conditions to have an absolutely sterile butter, for, although pasteurisation materially helps to this end, immediately the cream leaves the machine it becomes subjected to at least some reinfection—the extent of which as regards numbers and types of organisms depends principally on the degree of thoroughness observed in cleansing the different utensils and appliances with which the cream comes in contact, or on the bacterial condition of the water used in manufacture—and the period of this possible reinfection at the factory may extend even further until the butter is made and packed into boxes.

With this knowledge, and by applying what might be termed "safety first" principles, butter-makers in this State have made the exclusion of curdy matter in the form of butter-milk almost a fundamental principle in their work, and with this end in view, comparatively low churning temperatures, the use of break-water and gathering the butter to a fairly fine grain are among the methods of manufacture which are being almost universally adopted in butter factories here.

In almost direct contrast to these methods employed in New South Wales are those adopted in New Zealand, which aim at increasing the amount of butter obtainable from cream by incorporating a maximum amount of water and curd. At your conference last year the principal features of this method were stated to be the use of very little, if any, break-water and the gathering of the butter to the size of peas or larger.

In view of the dissimilarity in the two systems, and in order to test out the advantages claimed for the New Zealand method, the Director of Dairying was asked in conference to have comparative trials carried out. The following are the particulars of these trials, which members of the staffs of the Dairy and Biologist's branches of the Department carried out with the co-operation of the managers and the whole hearted assistance of the butter-room staffs of certain factories.

#### Particulars of Experimental Churnings.

The butter manufactured according to what is designated as "New South Wales method" was gathered to a rather finer grain than is generally the practice in this State, while in the case of the so-called "New Zealand method" the churning was continued without the addition of break-water until the grains, or, in this case, lumps, were the size of marbles. This was done deliberately in each instance in order that the margin of difference in the size of the grain would be what might be considered a maximum according to commercial practice. The trial butter mentioned as "modified New Zealand method" was inadvertently churned to the size of small according to break-water had been added.

The object of churning to different sized grain was to demonstrate whether or not this feature had any definite bearing on the curd content of the finished butter.

#### FACTORY A.

Churn 1 (Modified New Zealand Method):-

Original acidity of cream-.39 per cent.

Acidity reduced to-.15 per cent.

Cream heated to—185 to 186 deg. Fahr.

Cooled to-40 to 43 deg. Fahr.

Churning temperature—44 deg. Fahr.

Acidity at churning-.2 per cent.

Cream, "broke" in thirty minutes; gathered in fifteen minutes after adding break-water.

Size of grain-small peas.

Temperature of both break- and wash-water-41 deg. Fahr.

Worked fifteen minutes, which included six minutes in brine; balance with tap open and doors loosened.

Seventeen boxes of butter.

16 lb. of salt added.

Marked C1-V13-18-3.

Churn 2 (New Zealand Method):-

Acidity at churning-.2 per cent.

Churning temperature—45 deg. Fahr.

Churned right through with no break-water added in thirty-five minutes.

Size of grain-marbles.

Temperature of wash-water-43 deg. Fair.

Worked thirteen minutes, including six minutes in brine; balance with tap open and doors loosened.

Sixteen boxes of butter.

14 lb. salt used.

Marked (12-V3-18-3.

Churn 3 (New South Wales Method) :-

Acidity at churning-2 per cent.

Churning temperature—45 deg. Fahr.

Cream, "broke" in thirty minutes; gathered in sixteen minutes after adding break-water.

Size of grain-sago.

Temperature of both break- and wash-water- 41 to 42 deg. Fahr.

Worked fifteen minutes, including seven minutes in brine; balance with tap and doors loosened.

Fifteen boxes of butter.

15.lb. salt added.

Marked C3-V3-18-3.

The first and third butters were made in No. 1 churn, and the second lot in No. 2 churn. All butter was made in churns of long barrel type and from the same vat of cream.

#### FACTORY B.

Churn 1 (New South Wales Method):-

Original cream acidity-.42 per cent.

Acidity reduced to-..13 per cent.

Cream heated to-185 to 187 deg. Fahr.

Cream cooled to-43 deg. Fahr.

Churning temperature 45 deg. Fahr.

Acidity at churning-.14 per cent.

Cream "broke" in thirty minutes; gathered in fifteen minutes after adding break-water.

Size of grain—sago.

Temperature of both break- and wash-water-44 to 45 deg. Fahr.

Worked twelve minutes in brine, and after draining with one drainplate off and taps open, worked for a further fifteen minutes.

Twelve boxes of butter.

91 lb. of salt added.

Marked V5-C10-20-3.

#### Churn 2 (New Zealand Method):-

Churning temperature-46 deg. Fahr.

Acidity at churning-.14 per cent.

Churned right through without adding break-water for forty-five minutes.

Size of grain—large marbles.

Temperature of wash-water-43 deg. Fahr.

Worked in brine for nine minutes, drained, then worked for further eight minutes with drain-plate off and tap closed.

Moisture then found to be only 14.1 per cent., and 1½ gallons of water added to churn.

Working continued for four and a half minutes with tap and drains closed.

Twelve boxes of butter.

7 lb. of salt added.

Marked V5-C11-20-3.

These two lots were made in a short barrel churn ("Simplex" type).

#### Quality of Trial Butters.

The trial butters were first examined as to quality about one week after manufacture, and no appreciable difference could be noted between the individual units in each series. All were good Choicest quality, and of apparently good texture.

As a test of keeping quality they were then placed in cold store for two months, when it was intended to re-examine them, but unfortunately the butter made at Factory B had been inadvertently shipped out of the State and could not, therefore, be seen. However, the Factory A samples were re-examined by a Departmental grader in conjunction with an independent

judge of recognised ability, who found that sample Churn 1, marked C1-V3-18-3 (modified New Zealand method), which contained the least curd, viz., .54 per cent., was the weakest of the three in quality. There was, however, very little difference in flavour between the other two (New South Wales method and New Zealand method), which contained .76 per cent. and .90 per cent. of curd respectively, and that slight difference, which was assessed at only half a point, was in favour of the butter marked C3-V3-18-3 (New South Wales method); both were Choicest butters. The texture appeared quite satisfactory—incidentally this latter feature was somewhat surprising in respect of the sample made by the New Zealand method, considering the size to which the grain had been churned.

As far as this particular experiment is concerned, the final examination of the butters failed to prove that any definite relation exists between the presence of an abnormal amount of curd in butter and the quality of the latter, but in this connection attention is specially drawn to the final paragraph of the general observations on the bacteriological analyses connected with these trials given below.

#### Bacteriological Analyses connected with the Experiments.

A series of bacteriological analyses was made by Mr. H. H. Randell (Assistant Bacteriologist), who co-ordinated in this experimental work, to determine the amount of contamination which resulted during the process of manufacture of the butters, and his report is as follows:—

FACTORY A.

The samples examined and the total number of bacteria present in 1 gram
(1 c.c.) quantities of each are shown in the following table:—

Sample.			Bacteria per c.c.
Mixed cream in the vat, unpasteurised			430,000,000
Cream immediately after pasteurisation	•••		150,000
Cream at the base of the cooler			150,000
Cooled cream entering the storage vat			140,000
Cream entering the churn next morning			240,000
Rinsings from churn No. 2, before use			40,000
Rinsings from churn No. 1, before use			25,000
Water entering the sand filter		•••	100
Filtered water leaving sand filter			200
Chilled butter wash-water, from hose			200
Butter, large grain, New Zealand method		•••	26,000
Butter, fine grain, New South Wales method			30,000
Butter, medium grain (break-water added)	•••	•••	23,000

The cream selected graded 93 points for flavour, and showed an acidity of 0.39 per cent. It was similar to that ordinarily used in the manufacture of Choicest quality butter. Plate cultures made from a sample of the unpasteurised cream mixed in the vat showed a count of 430,000,000 bacteria per c.c. Although this count was high, and included a large proportion of objectionable bacteria, the cream itself contained no suggestion of foreign

odours or flavours. Such counts are not uncommon in fresh, unpasteurised cream. They merely indicate the amount of contamination that may occur during the production on the farms.

As the table shows, pasteurisation reduced the count of bacteria in the cream from 430,000,000 to 150,000 per c.c. This was considered efficient, as the types which survived would not be likely to cause deterioration of the butter, and their numbers would be further reduced by the processes of churning and working. The pasteuriser used was a "flash" machine (Universal type). Preliminary to pasteurisation, the cream was heated to 120 deg. Fahr, by means of a steam injector, which also acted as a pump to lift the cream from the neutralising vat to the pasteuriser. The temperature of pasteurisation was maintained at 185-186 deg. Fuhr. during the process. Adequate precaution was taken to clean and scald the pastrurising and cooling system before treating the cream. Plate cultures made from samples of the cooled cream showed no increase in bacteria due to contamination. The pasteurised and cooled cream was held overnight in a "Johnston" vat at 40-43 deg. Fahr. The inner surfaces of the vat and portion of the attemperator coils showed mottling, otherwise this utensil was in good condition. Plate cultures made from a sample of cream leaving the vat showed that the bacteria had increased during storage (overnight) from 140,000 to 240,000 per c.c. This increase was due to contamination from the vat, and could have been avoided had the vat been treated with very hot water before receiving the cream, instead of spraying with a warm-water hose.

The most serious sources of contamination of butter are the churn and worker, and there is little doubt that these utensils are the most difficult to clean. The experimental butters were made in two churns (long barrel type), which were cleaned in the following manner—the usual practice at this factory:—

#### Night (after use)-

- (1) Sprayed with hot water to remove adhering particles of butter.
- (2) Hot water (40 gallons) run in and boiled in churn by means of a steam hose.
- (3) A little "Clorize" was added to the water and the churn revolved for ten minutes.
- (4) The water run out and drained.

#### Morning (before use)—

- (1) Treated with 40 or 50 gallons of hot water, revolved five minutes, and drained.
- (2) Treated with chilled water to cool

The analyses of samples of the cold runse water taken from the churn just before they were used showed the following bacterial counts —

Charn 1 25,000 bacteria per c c. Charn 2 40,000

These counts were considered high, as they contained large numbers of

would become incorporated in the butter during the working process. The higher counts of bacteria in Churn No. 2 may be explained by the less sanitary condition of this churn. Observation showed fat-saturated woodwork at the ends, particularly at areas around the roller spindle and rim seams where cream had leaked out of the churn. The water used for washing the butter was found, on analysis, to be safe for use.

Plate cultures made from samples of the experimental butters after packing showed the following counts:—

Butter made by New Zealand method ... ... ... 26,000 bacteria per gram-,, ,, New South Wales method (fine gram) ... 30,000 bacteria per gram-,, ,, New South Wales method (med. grain) ... 23,000 ,, ,,

These counts were not considered to be abnormally high, but they included a considerable number of undesirable species of bacteria which might cause deterioration in the butter if conditions became favourable for their development. There was no significant difference in the total counts of bacteria in the samples of butter examined.

FACTORY B.

The samples examined and the total number of bacteria present in 1 gram (1 c.c.) quantities of each are shown in the following table:—

Sample.	Bacteria per c.e.
Mixed cream in vat, unpasteurised Cream immediately after pasteurisation Cream at the base of the cooler Cream from storage vat entering churn Rinsings from churn No. 2 before use Butter wash water Butter V5-Cl1 (large grain, New Zealand method Butter V5-Cl0 (fine grain, New South Wales method)	50,000 60,000 250,000 46,000 45,000 28,000

The cream selected for this experiment was similar to that ordinarily used in the manufacture of Choicest quality butter. It graded 93 points for flavour, and showed an acidity of 0.42 per cent. (calculated as lactic acid). Bacteriological analysis of a sample of the unpasteurised cream showed a total count of 520,000,000 bacteria per c.c. Of these 500,000,000 were lactics or desirable acid-forming bacteria. The remainder were objectionable types, and included large numbers of gas-forming and putrefying bacteria. The examination suggested contamination from utensils during production on the farms.

Cream was pasteurised by means of the Universal "flash" machine at 185 to 187 deg. Fahr. A steam injector was used to pre-heat the cream and raise it from the neutralising vat to the pasteuriser. The flow of cream through the pasteuriser was preceded by boiling water, which had the effect of adjusting the machine to the proper pasteurising temperature and sterilising the tray at the base of the machine. Pasteurisation reduced the count of bacteria in the cream from 520,000,000 to 50,000 per c.c. This process was considered efficient, as a further reduction in the number of bacteria would result during the process of churning and washing.

The pasteurised and cooled cream was delivered into an enamel-lined Batch vat, where it was stored overnight at a temperature of 43 deg. Fahr. With the exception of a small section of piping leading from the neutralising vat to the pasteuriser, which needed to be retinned, the appliances used in the pasteurisation and cooling of the cream were in good condition and were thoroughly cleaned before use. Plate cultures made from a sample of cooled cream showed a total count of 60,000 bacteria per c.c. This count showed a slight increase over the count in the cream immediately after it was pasteurised, but it was not considered high.

Recontamination of the pasteurised and cooled cream by objectionable bacteria occurred during storage overnight. Plate cultures made from a sample of the cream collected as it entered the churn showed a total count of 250,000 bacteria c.c. This count was somewhat high, and contained species of gas-forming and putrefying bacteria, which might cause deterioration of butter if conditions became favourable for their multiplication.

The churn (a "Simplex") in which the experimental butters were made was cleaned in the following way:—

Night (after use)-

- (1) Sprayed with warm water to remove adhering butter.
- (2) Hot water (30 gallons) run in, ½ lb. Wyandotte added, and the water boiled in the churn by means of a steam hose; the churn revolved for five minutes and emptied.
- (3) Hot water (30 gallons) run in, a little "Clorize" added, and the churn revolved and drained.

Morning (before use)-

About 30 gallons of chilled water run in and the churn revolved and drained.

Plate cultures made from a sample of the cold rinse water taken from the churn just before it was used showed a total count of 46,000 bacteria per c.c. Although this count was high and contained many objectionable gasforming and putrefying bacteria, it did not indicate the true sanitary condition of the churn, because the water used in the washing of the churn contained 45,000 bacteria per c.c., many of which were objectionable types similar to those found in the rinsings from the churn. The water used for washing the butter at this factory was drawn from a nearby river and filtered by means of powdered asbestos. Analysis of a sample of the filtered water showed it to be polluted and impure, and therefore unsafe for washing butter.

The experimental butters on analyses showed the following bacterial counts:—

Butter (New Zealand method)... ... 28,000 bacteria per gram. Butter (New South Wales method) ... 27,000 ...

Although these counts were not unusually high, they contained numbers of gas-forming and putrefying bacteria, which might cause the butter to deteriorate if conditions became favourable for their multiplication.

#### GENERAL OBSERVATIONS.

The most common factors which may influence the development of bacteria in butter are open texture, excessive amount of curd, free moisture, and suitable temperature. Deterioration may also result in butter if it is contaminated during churning by the decomposing milky matter which is so commonly found in the crevices or cracks of unsanitary churns, or if inferior quality cream has been used in its manufacture.

The presence of an abnormal amount of curd is detrimental to the good keeping quality of the butter, because curd is readily attacked by bacteria, often with the formation of offensive by-products. Should the curd be derived from fresh, untained cream, its presence in abnormal amounts is not usually marked by rapid deterioration of the butter, but should the cream used in the manufacture of the butter be tainted or contain curd which has already commenced to decompose, then the progress of deterioration will be rapid and seriously affect the keeping quality of the butter.

#### Chemical Analyses of Experimental Butters.

The analyses of the experimental butters carried out at the Chemist's Branch of the Department of Agriculture are as follows:—

Сне	MICAL A	nalyses o	of Butter	rs.		
Normal William Const.	Water.	Fat.	Curd.	Ash.	Salt.	Acidity.
,	per cent.	per cent.	per cent.	per cent.	per cent.	per cent
	$\boldsymbol{F}$	actory A.				
C1-V3-18-3 (modified New Zealand method) C2-V3-18-3 (New Zealand method)	15.28	83·08 82·04	•54 •90	1·1 1·42	1·04 1·31	·03
C3-V3-18-3 (New South Wales method)	17.70	82-66	-76	-99	-90	-04
	F	actory B.				
V5-C10-20-3 (New South Wales method) V5-C11-20-3 (New Zealand method)	15.38	83-07 82-84	-81 -99	·74 1·01	•66 •93	·10

The Chief Chemist (Mr. A. R. Ramsay) made the following summary of the above analyses:—

The moisture content of the butters produced is very uniform. This is more marked when comparison is made between Factory A trials (15.6, 15.6, and 15.3 per cent.) and Factory B trials (15.2 and 15.4 per cent.) taken separately.

It will be noted that fat content is higher in the butters made according to the New South Wales method both in Factory A and Factory B experiments, and the mean of the two experiments shows that the fat in butter produced by New South Wales method is 0.42 per cent. greater than of that made by the New Zealand method. The economic significance of this difference will be discussed later.

The curd content of butter made by the New South Wales method is lower than in the butter made by New Zealand method. In the Factory A trials it is 14 per cent. and in the Factory B trial 18 per cent. less. The mean of both trials is 0.16 per cent. less.

The salt in butter manufactured by New South Wales method is less than that manufactured by New Zealand method, notwithstanding that a greater proportion of salt was used in the New South Wales method. For each 1.000 lb. butter to be salted in the Factory A trials, 15.6 lb. salt was used in the New Zealand method and 17.85 lb. with the New South Wales method. In the Factory B trials the corresponding amounts are 10.7 and 14.1 lb. respectively. In the Factory A trials butter made by the New Zealand method contains 1.31 per cent. by weight of salt, and that made by the New South Wales method 0.90 per cent., or 0.41 per cent. of the weight of the butter, less salt than the New Zealand butter; or in other words, the New Zealand butter contains 45.5 per cent. more salt than does the New South Wales butter. In the Factory B trials the amounts were .93 per cent, salt for the New Zealand butter and .66 per cent. for New South Wales butter, the difference being .27 per cent., equal to a percentage increase of New Zealand over the New South Wales method of 40.9 per cent. The mean difference, over the two trials, in the salt content of the butters made by the two methods was .34 per cent.

The reaction of the various samples to phenolphthalein was acid in every case, and this has been expressed in terms of lactic acid. It will be noted that the acidity of the butter made by the New Zealand method is very slightly less than of the butter made by the New South Wales method in the trials made at Factory A, but in the trials at Factory B the acidity of butter made by the New Zealand method is very slightly greater than of the butter made by New South Wales method. The magnitude of the difference is only .01 per cent., and it is doubtful whether this has any definite significance.

With regard to the quantity of butter produced by the adoption of the New Zealand method of manufacture, the Factory A trial shows that while the New South Wales method would produce 100 lb., the New Zealand method would have produced 100.76 lb.—a gain of 0.76 lb. At the same time there would have been a saving of 36.6 per cent. of the salt used. In the case of Factory B trial each 100 lb. butter produced by adopting New South Wales method would have produced 100.28 lb. if the New Zealand method had been followed—a gain of 0.28 lb. At the same time there would have been a saving of 42.6 per cent. of the salt used. The means of both trials shows an advantage of 0.51 lb. butter and a saving of 39.6 per cent. of the salt used.

The economic advantages in favour of New Zealand method per 100 lb. of butter produced would be as follows:—

<sup>(</sup>a) Field a pound more butter at 179s. 10d. per cwt. (= 1s. "7d. per lb.) ... 9½d.

(b) A saving in salt used of 39.6 per cent, which, assuming 1.5 lb. salt is used for every 100 lb. butter to be salted, equals 59 lb. salt at £8 per ton (= 0.857 pence per lb.) ... ... ½d.

Against that would require to be offset any deterioration occurring during storage, the amount of which could only be determined after the completion of the cold storage trials.

#### Size of Grain in Relation to Curd Content.

Since the chemical analyses show that in the Factory A trial, where the grain was churned to an intermediate size between that obtained in the New South Wales and New Zealand methods, the curd content, namely, 54 per cent., was much lower than in either of the other two butters, and that the curd content of the sample (New South Wales method) which was churned to an unusually fine grain was found to be .22 per cent. greater than the first-mentioned figure, it would appear that no definite correlation between the size of the grain and the curd content in the finished butter has been demonstrated by these trials as a whole.

#### Incorporation of Moisture.

The analyses of these experimental butters suggest the probability of moisture incorporation being just as successfully carried out by using New South Wales methods of manufacture as by adopting New Zealand procedure for this purpose, but the degree of accuracy with which it may be accomplished depends almost entirely on the individual ability, judgment, and observation of the butter-makers, for as conditions, such as speed of worker, type of churn, composition of the butter-fat in the cream in regard to the percentage of hard and soft fats contained, and other factors show variation in New South Wales factories and districts, no general set formula can be laid down, especially with reference to the necessary time required for working butter.

#### Retention of the Maximum Percentage of Salt Added.

Although in the trials under review the analyses show that a greater proportion of the salt added had been retained when the New Zealand method was used, it is considered that with our comparatively fine-grained butter a more complete draining of the churn before salting would produce a greater concentration of salt and result in an increased percentage of the latter substance in the form of brine being incorporated. This would reduce to a minimum the amount of brine usually allowed to run away during the later period of the working process, and the margin of difference in the amount of salt retained could in this way no doubt be greatly reduced or even wiped out.

#### Keeping Quality the most Vital Field for Comparison.

The effect of an increased amount of curd in butter has been discussed from a New South Wales viewpoint, and it would appear that the field for comparison between the two methods of manufacture has been narrowed down mainly to that of keeping quality. The fact that the butters from Factory B were unavailable for final examination after storage reduced the value of the present trials in this connection, and even had this information been available many further similar tests would still be

A 1 12 4 3

necessary before data would be available to enable conclusive comparison to be made concerning the most important feature associated with the matter, namely, keeping quality.

#### TUBERCLE-FREE HERDS.

OF the herds which have been tested for tuberculosis by Government Veterinary Officers, or approved veterinary surgeons, in accordance with the requirements of the scheme of certifying tubercle-free herds, the following have been declared "tubercle-free," and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.					Number tested.	Expiry date of this Certification.
H. A. Corderoy, Wyuna Park, Comboyne (Geurn	sevs)		•••	}	54	1 Nov., 1930
New England Experiment Farm, Glen Innes (Ay	rshires	)	•••	•••	62	3 ,, 1930
S. G. Winkley, Dorrigo	•••	•••	•••	••••	85	8 ,, 1930
J. Davies, Puen Buen, Scone (Jerseys)	•••	•••	•••		40	11 ,, 1930
Department of Education, Brush Farm, Eastwood	od	•••	•••	•••	7	22 ,, 1930
Lunacy Department, Callan Park Mental Hospit	al	•••		••••	28	29 , 1930
Bathurst Experiment Farm (Jerseys)			•••		30	1 Dec., 1930
Lunacy Department, Morisset Mental Hospital	•••	•••	***	•••	24	7 Jan., 1981
C. J. Parbery, Allawah, Bega	•••	•••	•••		88	7 ,, 1981
Kinross Bros., Minnamurra, Inverell (Geurnseys)	· · · ·	•••	•••	•••	72	11 ,, 1981
New England Girls' Grammar School, Armidale	•••	•••	***	••••	21	16 ,, 1931
Lunacy Department, Parramatta Mental Hospit	al	•••	•••	•••	89	28 ,, 1931
W. M. McLean, Five Islands Rd., Unanderra	•••	•••	***	•••	73	80 1931
Miss Brennan, Arrankamp, Bowral Department of Education, Yanco Agricultural E			•••	•••	10	19 Feb., 1981
Department of Education, Yanco Agricultural E	(igh Sc	hool	•••		33	21 ,, 1931
G. A. Parish, Jersevland, Berry	•••		•••	••••	103	27 , 1981
Lunacy Department, Kenmore Mental Mospital	***		•••		76	28 1981
Hawkesbury Agricultural College (Jerseys)	•••	•••	•••	•••	160	1 Mar., 1931
St. Joseph's Girls' Orphanage, Kenmore	•••	•••	•••		10	3 ,, 1931
St. Michael's Novitlate, Goulburn			•••		5	3 , 1981
Kyong School, Moss Vale			•••		3	4 ,, 1931
St. Joseph's Convent, Reynold-street, Goulburn	***	•••	•••	•••	4	4 ,, 1931
St. John's Boys Orphanage, Goulburn	•••	•••	***		7	5 ,, 1931
Marion Hill Convent of Mercy, Goulburn			•••	•••	10	6 ,, 1981
Cowra Experiment Farm	•••				29	6 ,, 1981
Riverina Welfare Farm, Yanco	•••		•••		69	6 ,, 1931
Wilkins, James, Jerseyville, Muswellbrook	•••		•••		51	12 ,, 1931
Tudor House School, Moss Vale				•••	8	21 1981
H. F. White, Bald Blair, Guyra (Aberdeen Angu			•••		202	3 April, 1981
Grafton Experiment Farm (Ayrshires)			•••		180	5 ,, 1981
Department of Education, Hurlstone Agricultura	al High	School	•••		45	10 ,, 1931
Navua Ltd., Grose Wold, via Richmond (Jersey	B)		•••		18	29 ,, 1981
Australian Missionary College, Cooranbong			•••	•••	45	80 1931
J. P. McQuillan, Bethungra Hotel, Bethungra	***				6	1 May, 1981
George Rose, Avimenton	•••		4**		4	28 , 1931
William Thompson, Masonic School, Baulkham	Hills		•••	•••	48	28 ,, 1981
Department of Education, Gosford Farm Homes	3		•••		30	3 June, 1931
F. C. Kershaw, Macquarie House, Macquarie Fie	elds	***	***		71	5 ,, 1931
P. Ubrihien, Corridgeree, Bega		•••	***		114	6 . 1981
Gladesville Mental Hospital	***	•••		]	42	25 1931
A. L. Logue, Thornbro, Muswellbrook			***	•••	40	28 July, 1931
Webb, A. H., Quarry-road, Ryde	***	***	•••		4	26 ,, 1981
A. Shaw, Barrington (Milking Shorthorns)	,	***	***		122	9 Aug., 1981
R. P. Perry, Nundorah, Parkville (Geurnseys)	***		•••	•••	22	18 ,, 1931
Wagga Experiment Farm (Jerseys)	***	***	***		55	14 , 1931
Sacred Heart Convent, Bowral		***	***		12	20 . 1931
St. Patrick's College, Goulburn	***		***		8	22 1931
Walter Burke. Bellefaire Stud Farm, Appin (Jer	seys)	***	***		46	22 , 1931
James McCormack, Tumut	444	•••	***	•••	111	29 . 1931
H. W. Burton Bradley, Sherwood Farm, Moorla	nd (Jer	seys)	***	•••	81	12 Sept., 1981
J. F. Dowe, "Woolomel," Tamworth S. L. Wills, Greendale Dairy, Cowra	•••	***	***	•••	42	19 ,, 1981
S. L. Wills, Greendale Dairy, Cowra	••	***	•••		24	19 ,, 1931
Wolarai College, Orange			•••	***	10	4 Oct., 1931
Riverstone Meat Co., Riverstone Meat Works, I	Liversto	me	***	***	104	11 ,, 1981
E. S. Cameron, Big Plain, Narrandera		•••	***	***	28	14 ,, 1931
J. L. W. Barton, Wallerswang	***	***	•••	***	17	17 ,, 1931
J. F. Chaffey, Glen Innes (Ayrshires)		***	•••	***	75	
Wollongber Experiment Farm, Lismore (Guern	seys)	4++			180	21 Nov., 1931
. 1	8/	TI	- 01		T7 - 1 - 1 - 1	
· ·	XAIX	<b>LENR</b>	x, U	πer	A GLGLIUS	ry Surgeon.

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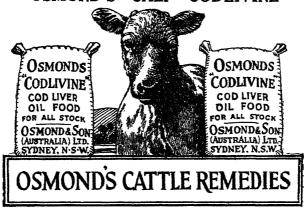
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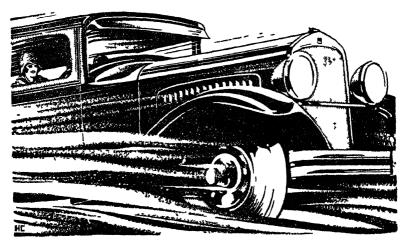
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# Raising the General Standard of Work in the Apiary.

W. A. GOODACRE, Senior Apiary Instructor.

In the management of apiaries we almost invariably find some colonies doing much better than others, and this fact suggests a field of investigation which should prove both interesting and profitable. The ambitious beekeeper will endeavour to raise the standard of all colonies to that shown by the outstanding ones. A serious attempt at this work, even if complete success is not attained, will do much towards uplifting the industry generally.

The factors responsible for the highest standard of progress are revealed only by the exercise of careful observation, and much will be gained from close examination and comparison of the operations of the various colonies. The queen bee, the workers, material, and management all play important parts. Many attribute the whole success or failure of a colony to the queen, but even a good queen could not show progressive work without good brood combs to lay in, properly adjusted material to allow of expansion of the brood nest, or sufficient accommodation for honey storage for her bees. Many believe, too, that the value of a queen depends on the number of eggs she can lay, but it is often noticed in certain strains that there is a concentration on brood rearing at a time when the bees should be going in for honey storage. Much depends on the queen's work certainly, but other matters must also be considered.

Factors considered to lead to the best results in the hive may be outlined as follows:—The queen herself should show good development, so that she will have stamina to keep up the laying of a large number of eggs daily, probably up to twice the weight of her own body during some days, and that when the position demands it during the honey flow to be able to concentrate on an average-sized brood nest and by methodical laying still keep up a good population. Her bees need to be hardy, vigorous workers, having vitality to withstand the strain imposed on them by heavy field work. They should be "friendly" enough to allow of the manipulation of the hive completely with a measure of comfort to the apiarist. This friendliness allows of careful handling and therefore makes for improved management. Other qualifications desirable in the queen are that her worker progeny should show resistance to disease and not be imbued with swarming tendencies.

In regard to the combs in the hives, they should be well built from full sheets of comb foundation or its equivalent, and so placed in the hive, especially in the brood chamber, that every convenience is available to aid the queen in her work, as well as for the incubation of the brood by the bees. There is a particular place in the hive for every sort of comb-

Nothing but the best, well-built worker combs should be put towards the centre of, not only the brood chamber, but also in any supers to which the queen may have access. Combs even slightly buckled, those with holes in them, or any containing drone cells should always be placed towards the side of the hive. This arrangement results in the best of the combs being placed in the centre of the brood chamber and supers, and the others, in the order of their value for brood rearing work, ranging from the centre toward the sides. There are times during the season when faulty combs may be replaced without undue interference with the brood-raising work, those on the sides of the hives being worked up to the supers and finally, during extraction of the honey, put aside for melting down.

The hive material should provide a maximum of comfort for the colony right throughout the year and ample accommodation made available by the addition of combs or supers as required for progressive work. The factorymade hive is designed to give comfort for the bees and convenience in manipulation.

There is another matter which might with advantage be discussed, and it is the effect on certain hives, owing to their situation in the apiary, of what is known as "drifting" of bees. Bees returning from the fields loaded with honey travel in a direct line, and certain obstructions, such as trees, fences, &c., may throw the bees out of their course, and being heavily burdened and tired they will enter the most convenient hive to give up their stores. Perhaps on the next trip they will return to their own hive, but how many times have we heard the complaint that bees in a certain row of hives never come up to the others, whereas often the cause of the trouble is that some obstruction near the apiary has resulted in drifting. The manner in which drifting bees enter a strange hive usually renders them immune from attack; they have not the nervous movement of robber bees, and so come and go unmolested. Where some colonies show little progress, drifting should always be suspected as a cause.

#### SUMMER SCHOOL FOR BEEKEEPERS.

A FURTHER reminder is given intending applicants that their applications for admission to this course, which is to be held at Hawkesbury Agricultural College, Richmond, from 6th to 21st January, must reach the Under Secretary, Department of Agriculture, Box 36a, G.P.O., Sydney, not later than 18th December. A prospectus containing full details of the course can be had on application.

A compost heap or pit is of special value in that it utilises all sorts of vegetable and animal refuse which would otherwise be wasted and converts it into a valuable manure, rich in organic matter and eminently suited to seels low in humus or subject to droughty conditions.

# Development in Oranges.

A STUDY OF THE INFLUENCING FACTORS.

J. D. BRYDEN, Orchardist, Riverina Welfare Farm, Yanco.

CASUAL observation of orange trees and groves has shown that, quite independently of the quantity of crop carried, certain conditions accelerate or retard the development of oranges. It has been noticed that during some years mostly large oranges are produced, while the bulk of crops in other years is made up of smaller-sized fruits. It would appear that whatever the conditions responsible for this variation, they are evident to a greater or less extent in all districts, although in areas where irrigation is practised the range of variation is not so great as where the rainfall is the sole source of water supply.

To secure information which might definitely point to the cause of this yearly variation in size of oranges, and to determine, if possible, the factor or factors most responsible, investigations were commenced at Yanco orchard in 1928 and were continued in the 1929 season. It was desired that data be collected in connection with the growth of oranges, so as to determine to what extent such growth was influenced by climatic conditions prevailing over the growing season and by the condition of the soil as regards moisture during that period. It was necessary also to take into consideration manurial treatment, pests, &c., and any other factors that might affect the development of the crop.

For this work one 15-year-old Valencia tree and one 17-year-old Washington Navel tree were used. These trees, which are both on sweet orange stock, are growing under irrigation conditions in a moderately shallow stiff clay loam overlaying a heavy clay subsoil, and are of average vigour. The trees comprising the grove are planted 24 feet apart.

The actual growth of twenty-five oranges in the surface foliage and the same number amongst the inner foliage of a tree of each variety was recorded in 1928 at intervals of one month from 26th March to 17th July (in the case of Navels), and in the case of the Valencias to 8th October. An examination of the information obtained in 1928 showed clearly that the interval between measurings (one month) was too long, and that throughout the growing season (and especially during the period of early development) more detailed information would be of greater value, and also that it would be an advantage to commence measuring at an earlier date. Consequently in 1929 measuring was commenced as early as 28th January, and continued at intervals of one or two weeks until 5th August of that year in the case of Navels, the Valencias being measured until 9th December, when they were harvested.

The average sizes of the oranges in the different groups were determined at each measuring, and these, together with the maximum and minimum temperatures and approximate quantities of water available, are given in graph form. (Figs. 1 and 2.) The estimated quantity of water supplied by irrigation, plus the amount of rainfall, is shown for each month, while the broad line is intended to show the probable moisture content of the soil over the whole period. The small arrows indicate dates on which irrigation commenced.

Details of the weather conditions were carefully recorded during the periods from commencement of measuring until the crops were harvested, and in the following table a brief summary of the weather for each month is shown under the headings wind, cloud, and general. Particulars of wind, including direction of prevailing wind, are given, and the number of cloudy days is shown, while the kind of weather is included under the heading of general.

WEATHER During Periods of Measuring.

Month.	Wind.	Cloudy Days.	General.
1928 Period—			
April	Moderately windy W	11	Mild.
May	Moderately windy W	12	Mild to cool.
June	Little wind S	16	Cool.
July	Moderately windy W	8	Cool, but fine.
August	Little wind S.W	5	Cool to mild.
September	Very windy W	11	Mild to warm.
	Very windy W	3.	Warm.
1929 Period-		1	
February	Very windy W. to N.W	2	Clear and bright, warm to hot,
March	Windy S. to W	6	Clear, warm, some cool winds.
April	Windy S. to W Windy S. to S.W		Cooler, some warm days.
Мау	Little wind S. to S.E	8	Cool.
	Moderately windy S	5	Cold, very dry.
	Some wind S. and S.W	1 -	Cold.
August	Windy W. to S.W	8	Cool, few warm days, rain.
	Moderately windy S. to S.E	7	Warmer.
October		1	Mild to warm.
November	Windy S. to W	H 77	Mild to warm, but periods of very cool weather.
December	Windy W. to S.W	2	Cool to hot.

The trees under observation have not actually been affected by pests or diseases, but both were fumigated with "Cvanogas A" dust in 1927, when the whole grove was treated for red scale.

#### The Influence of Fertilisers.

Records show that the Valencia tree received fertiliser in the form of Newcastle abattoir manure at the rate of 10 cwt. per acre in 1922 In 1926 gypsum was applied at the rate of 30 cwt. per acre The only manurial perturent received by the Navel tree during this period was stable manure in 1924. Sulphate of ammonia (5 lb. per tree) was applied to each tree

1928, and a further 5 lb. in February, 1929. Tick beans at the rate of 1 bushel per acre with 1 cwt. of superphosphate were sown in alternate rows throughout the grove in early March, 1929.

It is considered that the fertiliser applied to the Valencia tree in 1922 would have no material effect on the crop of 1928, and while it is probable that the dressing of gypsum received by the Valencia tree in 1926 and the stable manure applied in 1925 to that section of the grove comprising Navels would have a beneficial effect on the soil for a period of two or three years, it is unlikely that this treatment would be a factor influencing actual size of oranges in 1928 or 1929. The sulphate of ammonia applied in the spring and summer of the 1928-29 season would undoubtedly benefit the trees, and a small increase in size might be accounted for as due to these applications. It is probable, however, that the benefits derived by the trees, and especially as affecting size of fruits, would be more apparent in the following season, so that difference in size between fruits produced in 1928 and those of the 1929 crop cannot, to any great extent, be attributed to the nitrogen received by the trees during the 1928-29 season. The cover crop sown in 1929 would, under normal circumstances, have very little influence on the size of fruits during that year, and in this particular case no consideration can be given, as owing to the very dry weather experienced, together with a number of heavy frosts, the crop was a failure. The superphosphate applied with the cover crop seeds can also be disregarded as a factor influencing size in that year.

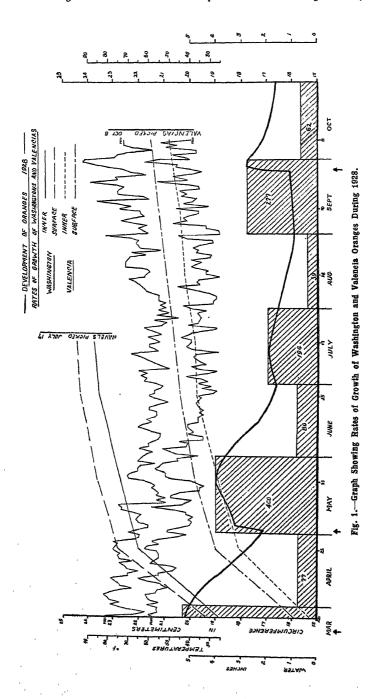
Taking into consideration these details of manurial treatment, it is obvious that, with the exception of a probable slight increase in size of the oranges produced in 1929 as a result of the application of a nitrogenous fertiliser, little or no effect due to such treatment would be noticeable in size of fruit during the two years of investigations that are covered by this report.

It must also be borne in mind that this variation in general size from year to year has been observed to occur in groves and districts where the manurial treatment is more or less the same each season, and although this aspect cannot be entirely disregarded, it is not unreasonable to suppose that manures and fertilisers are of little importance as a factor in connection with this particular problem.

#### Observations made during the Experiments.

A study of the curves representing growth in 1928 (Fig. 1) shows a rapid increase in size of both Washingtons and Valencias for the period between the first measuring (26th March) and 23rd April, and a slower rate from that date until the oranges were harvested.

Although the rainfall during the winter of 1928 was lower than usual for those months, the weather experienced may be regarded as approximately normal. It will be noticed that the condition of the soil as regards moisture was moderately even throughout the period May to September, and in all probability the moisture was more evenly distributed than is



indicated in the graph, as a reserve supply in the soil would result from the heavy rains during January, February, and March of that year. The large quantity of water available to the trees during that period was, no doubt, responsible for the rapid development of the fruit until 23rd April. During the following month the rate of growth was lower, although water was applied by irrigation on 1st May. The actual response in growth to this moisture is not indicated by the curve, due to the long period between measuring (one month), which would tend to modify variations in the rate of growth as shown by the curve—the increase in size being equally distributed over the whole period. This inexactitude was obviated in 1929 by measuring at more frequent intervals.

In the following table is shown the average size, on the dates of measuring, in 1928, and also the average increase during each interval of the oranges in the different groups. The measurements are circumferences in centimetres.

	Washington.					Valencia.				
Date of Measuring.			rface. Inner.		Surface.		Tnner.			
	Mean Size,	Mean Increase,	Mean Size.	Mean Increase.	Mean Size.	Mean Increase.	Mean Size.	Mean Increase.		
1928. 26 March 23 April 21 May 25 June 17 July 14 August 10 September 8 October	22.8 23.6 24.3 24.4 (Nav	cm. 3·4 0·8 0·7 0·1 vels harves	cm. 18·9 22·0 22·7 23·5 23·7 ted 17-	em. 3·1 0·7 0·8 0·2 7–28.) {	cm. 15·9 19·0 19·8 20·4 20·6 20·9 21·2 21·5	cm. 3·1 0·8 0·6 0·2 0·3 0·3 0·3	cm. 15·3 18·1 18·9 19·7 19·8 20·2 20·4 20·8	em. 2.8 0.8 0.8 0.1 0.4 0.2		

DEVELOPMENT of Oranges, 1928.

The figures given in this table show that relationship existed as regards increase in size between the oranges in the various groups. For instance, the increases from 26th March to 23rd April for the surface and inner foliage Navels and for the surface and inner foliage Valencias were, respectively, 3.4 cm., 3.1 cm., 3.1 cm., and 2.8 cm., while from 25th June to 17th July, the increases were 0.1 cm., 0.2 cm., 0.2 cm., and 0.1 cm., respectively. This relationship suggests that size of oranges in 1928 was directly controlled by some factor which influenced the entire crop of both Navels and Valencias more or less equally. That this is not always so precisely the case is proved by the results obtained in 1929, which show that under certain conditions the growth of Valencias was checked, while a slight increase in size of Navels was recorded.

During the 1928-29 season much more information was obtained as a result of the measuring being commenced at an earlier date and carried out at shorter intervals than was the case in 1928. It was possible, too, to

vary the quantity of water available to the tree, and in addition an extended dry period was experienced during May and June, when very little rain fell and no water was available for irrigation until early July.

In the following table the average sizes on the dates of measuring in 1929, and average increases during each interval for the different groups under observation are presented. The measurements are circumferences in centimetres.

DEVELOPMENT of Oranges, 1929.

		Wash	ington.		Valencia.			
Date of Measuring.	Sur	face.	In	ner.	Sur	face.	Tnr	er.
	Mean Size.	Mean Increase.	Mean Size.	Mean Increase,	Mean Size.	Mean Increase.	Mean Size.	Mean Increase.
1929. 28 January 4 February 11	23.62 23.69 23.71 23.76	cm. 0.06 1.82 1.2 0.7 0.1 0.9 0.5 1.0 1.2 0.6 0.8 0.6 0.3 0.1 0.1 0.02 0.07 0.02 0.05	cm. 14·2 14·27 16·2 17·3 18·0 18·2 19·6 20·5 21·7 22·3 23·6 24·0 24·2 24·3 24·32 24·7 24·76 24·85	cm. 0.07 1.93 1.1 0.7 0.2 0.9 0.5 0.9 1.2 0.6 0.8 0.5 0.4 0.2 0.1 0.02 0.38 0.06 0.09	em. 9.45 9.45 9.49 11.0 12.44 13.16 13.11 14.06 15.54 16.71 17.14 17.88 18.53 18.62 18.45 18.36 18.67 18.75 18.92 20.5 20.88 21.84 21.85 22.25	cm. 0.04 1.51 1.44 0.72 *0.05 0.95 0.66 0.82 1.17 0.43 0.74 0.42 0.23 0.09 *0.17 *0.09 0.31 0.08 0.17 0.53 0.75 0.3 0.38 0.75 0.3 0.38 0.75	cm. 10·28 10·29 11·91 13·22 13·89 13·83 14·73 15·37 16·26 17·34 17·74 18·4 18·96 19·05 18·83 18·97 19·31 19·59 20·97 21·34 21·77 22·97 23·47	6m.  0·01 1·62 1·32 0·67 *0·06 0·9 1·08 0·4 0·16 0·09 *0·17 *0·05 0·34 0·14 0·28 0·67 0·71 0·37 0·43 0·94 0·94 0·95
25 9 December	]				22·41 22·56	0·16 0·15	23.65 23.8	0·18 0·15

<sup>\*</sup> Denotes decrease in size.

The growth curves for 1929 (Fig. 2) show a check in growth when the first measurements were taken. It is considered that rapid growth takes place from time of setting until late April, so that this check in growth was, in all probability, merely temporary and caused by a variation in the amount of moisture available. This view is borne out by the behaviour of the fruits under observation during the period 25th February to 4th March, when the growth of Navels was retarded and the Valencias received

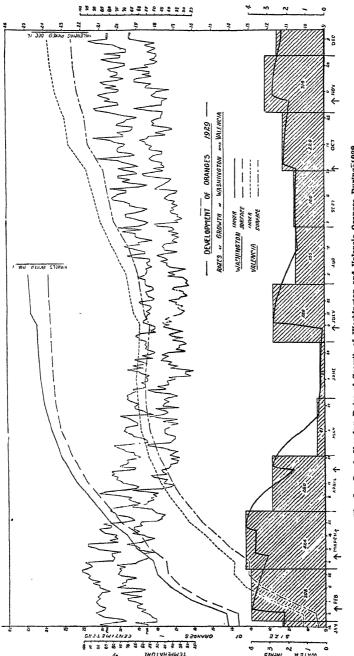


Fig. 2.—Graph Showing Rates of Growth of Washington and Valencia Oranges Duringil 929.

a more severe check, the fruits of this variety actually decreasing in size. At this particular time the check in growth cannot be attributed to an actual deficiency of soil moisture, as water equivalent to 250 points of rain was supplied by irrigation on 7th February, and in addition the natural precipitation for the month was 148 points. These facts indicate that while unlimited supplies of water might not have been available in the soil, the moisture content should have been sufficient to carry the trees over until the next watering, which was on 7th March. The probable explanation, then, is that the high temperatures prevailing during that period caused an increased loss by transpiration and evaporation, such loss taking place much more rapidly than absorption. In responding to this temporary derangement the tree might possibly have found it necessary to resort to the fruit.

From the table of sizes in 1929 it will be seen that from 25th February to 4th March the surface foliage Valencias decreased in size 0.05 cm., and those among the inner foliage 0.06 cm., while the Navels increased 0.1 cm. in the case of surface fruits and 0.2 cm. in the case of inner foliage fruits. This is probably due to the Navels being larger and at a more advanced stage of maturity.

These data show that during the period of early development insufficient water, and especially if such a condition is accompanied by high temperatures, retards the growth of oranges—the check being more or less severe according to the stage of development of the fruit.

At a later period, during May, June, and early July, when the moisture content of the soil was very low, the rate of growth of Valencias was gradually retarded until a point was reached when the oranges commenced to decrease in size, and they continued to do so until water was applied on 8th July. It will be noted that during this period low temperatures were recorded, which might account for the check in growth occurring at a slower rate than was the case from 25th February to 4th March. While these conditions prevailing in the May-June period affected the growth of Valencias, no serious effect on the development of Navels was apparent, which, in all probability, was due to this variety being closer to full maturity.

From the records of development obtained during the periods late February to early March and May to early July it would appear that under certain conditions the trees will resort to the fruit for nourishment. It is, however, impossible to state definitely at this stage whether such is the case, or whether the oranges decrease in size because of transpiration loss when a curtailment of food supply to the fruit occurs.

When water was applied on 8th July there was a noticeable response in rate of growth of both inner and surface Valencias and of inner foliage Navels, the increase in size from 9th July to 15th July being 0.31 cm., 0.34 cm., and 0.38 cm., respectively. Surface foliage Navels for the same period increased only 0.07 cm., and this suggests that these fruits were at full maturity slightly in advance of the fruits borne on inner foliage.

From July until the Valencias were harvested the water content of the soil was maintained as even as possible, so that adequate quantities would be available to supply the requirements of the tree. The curves indicate that the fruits recovered rapidly from the checks in growth and increased in size until they were picked. In the absence of several checks in development the oranges would probably have been larger. The quantity of water available to the trees during the period July to harvest was very much greater in 1929 than in 1928, and the rapid recovery from the check in growth, as well as the production of large-sized Valencias in 1929 as compared with the 1928 crop, are probably the direct results of this sufficiency of available moisture. Consideration must of course be given to the longer growing period of Valencias in 1929, but on 8th October of that year, which is the equivalent of the 1928 picking date, the mean size of Valencias was 21.8 cm., while in 1928 the mean size was 21.15 cm.

#### General Conclusions.

It is probable that the quantity of crop has some slight bearing on the size of oranges produced by individual trees in any given year, but this does not explain the difference in general size of fruits in districts where a similar percentage of setting is obtained. In this particular work the crops borne by the trees under observation were similar as regards quantity each year, so that it was unnecessary to take this factor into consideration.

The data collected during the two years would seem to indicate that the amount of moisture available to the trees is the most important factor influencing size of oranges over any given period of development, or during the whole of the growing season. Information obtained in 1929, when the soil moisture content varied considerably, shows definite correlation between this factor and the size of fruits produced. Soil moisture, in turn, is controlled by a number of agents, such as rainfall, temperature, and wind, also by cultural operations and by irrigation. In areas where water can be supplied by irrigation it is usually possible to maintain a fairly even soil moisture content, and this probably accounts for the more stable size of fruits produced under irrigation conditions.

It will be noticed that in 1928 the surface foliage fruits of both Navels and Valencias were larger, but in 1929 the reverse was the case with both varieties. It is difficult at the present time to determine the cause of this, as sufficient information is not available to allow an opinion to be formed. It is considered likely, however, that the very large quantities of water available, due to an abnormally high rainfall during the period of early development in the 1927-28 season, as compared with only moderate quantities, most of which was supplied by irrigation, during the same months of the 1928-29 season, are in some way responsible for the reverse positions of the different groups as regards size.

From the information obtained it would appear that the conditions prevailing immediately after setting determine the size of inner foliage fruits as compared with fruits on the surface foliage. It was found that during

the period when measurements were taken in connection with this investigation, the rate of growth was similar on fruits of one tree, so that whatever the cause which determines the difference in size between inner and surface fruits, the influence must be exerted prior to the dates when measuring was commenced.

Further study along the lines of this investigation, to investigate thoroughly each particular cause that could influence size of oranges in any year is necessary before definite conclusions can be arrived at. It is considered, however, that soil moisture is the most important factor to be dealt with, and this will necessitate a good deal of work being carried out over a period of years, so that the relation between size of oranges and various combinations of the conditions controlling soil moisture can be determined.

That this variation in size can be entirely eliminated is highly improbable, as a number of the conditions, apparently responsible, are beyond control. It could, however, be minimised to a greater or less degree by the thorough application of sound cultural practices, and it is probable that when the investigations are completed the recommendations for any control thought possible will consist of suggestions regarding cultural operations, such as subsoiling, ploughing, cultivating, soil improvement, and humus and weed control.

#### Summary.

The information obtained to date as a result of these investigations is not, by any means, to be regarded as final, but the following points seem to be indicated:—

- (1) Correlation exists between soil moisture content and rate of development of fruits.
- (2) The amount of moisture available to the tree is the most important factor influencing size of oranges.
- (3) Although manurial treatment cannot be entirely disregarded as a factor, it is of lesser importance.
- (4) The more stable size of oranges grown under irrigation is due to the maintaining of an even soil moisture content made possible by the artificial application of water.
- (5) Relationship exists as regards rate of development between oranges borne on the inner and those on the surface foliage of both Washington and Valencia trees.
- (6) Insufficient moisture during the period of development, and especially if high temperatures are experienced, retards the rate of growth of oranges.
- (7) The lack of available moisture during early development causes a greater check than when the fruits are more fully matured.
- (8) Oranges quickly recover from a check in growth where such check is caused by a variation of the soil moisture content.
- (9) The size of inner foliage fruits as compared with those borne on the surface foliage is controlled to a great extent by climatic conditions and water available immediately after setting.



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G. D. ROSS, Under Secretary, Department of Agriculture

## A New Virus Disease of Bananas.

C. J. MAGEE, M.Sc., B.Sc.Agr., Assistant Biologist.

During May of last year the attention of the Department was drawn to an apparently new disease affecting banana plantations at Tuntable Falls, Nimbin. The disease was at first considered to be due to local soil and climatic conditions, but the persistence of the trouble and its appearance in fresh plantings led to the belief that it was of a much more serious nature, and its investigation was undertaken.

#### Symptoms.

The disease takes the form of a severe yellowing and mottling of the younger foliage, followed by a rotting of the heart-leaf and central portion of the psuedo-stem. The "heart-rot" stage of the disease apparently occurs only during the winter months, but the yellowing and mottling may persist throughout the year. In young plants the disease first appears as whitish or yellowish-white streaks, which may extend from the mid-rib to the margin of the most central leaves. These chlorotic areas may vary from narrow streaks to bands half an inch or more in width. In some leaves the streaks are not continuous, giving rise to a mottled appearance of yellow and green areas. During the summer infected plants continue to produce this mottled type of foliage, but with the advent of cooler weather many of the plants commence to rot at the heart-leaf, the rotting extending down into the corms and finally killing the plants.

#### Cause.

Preliminary experiments carried out by the writer during the present year have shown that the disease is infectious, and may be transmitted from diseased to healthy plants by means of the banana aphid (*Pentalonia nigronervosa*)—the insect which is already well known to banana growers on account of the part it plays in spreading "bunchy top." Evidence suggests the disease is an infectious chlorosis or mosaic belonging to the virus disease group.

At present the disease is confined to only a few plantations in one locality, but in one plantation at least it has caused serious losses. Banana growers are advised to be on the lookout for this disease, and any plants which arouse their suspicions should be immediately reported to the banana inspector in their zone. This disease is distinct from "bunchy top," but it is conceivable that were it to become widespread it would be an equal or more serious menace to the banana-growing industry. The disease is still under investigation.

#### IMPORTS AND EXPORTS OF FRUIT.

THE following table, compiled by the Government Statistician, shows the imports and exports of fruit-fresh, dried, and processed-during the quarter ended 30th September, 1930:-

Description.		Imports.	Exports.	Description.	-	Country of Origin,	Imports.	Exports.
Interstate.				Oversea.				
	ı	Cases	Cases.	Fresh Fruits-	-		Centals.	t'entais.
Fresh Fruit		591.358	223,790	Apples		*********	1 .	4.034
Tomatoes		182,420		Bananas		*******	3,948	
		ounches.		Lemons			1	1,416
Bananas		1,470		Oranges		********	54	29,440
	1	trays.		Grape Fruit		********	121	61
Strawberries		12,370		Pears				280
		tins.		Pineapples				2,623
,,		67		Other		*********	155	22,950
		cases.	lb.					
Melons	••	18		Dried Fruits-	-		1b.	lb.
		11).		Apples		********		5,531
Canned Fruit	••	167,728	728	Apricots		*********		1,326
			1 1	Currants		**********		52,843
Dried Fruits-				Figs	•••	United Kingdor		
	***	5,292	280			Smyrna	. 144	
Currants	41	4,284	22.	Peaches		*** ******		500
Raisins		5,292	112	Prunes	•••	*********	• • • • • • • • • • • • • • • • • • • •	3,080
Apricots	••	364		Raisins-			1	İ
Apples	***	560	56	Sultanas	١.,	********		210,356
Peaches	••	392		Lexias	• • •	********		8,460
Pears	•••	168		Other	••			332
Prunes	•••	476	8,960	Dates	***	Mesopotamia	52,000	39,521
				Other	•••	United Kingdon		733
						China	2,634	•••
				Proserved in liqu	A.			
				1			1	
				A pricets Peaches	•••	**********	***	506,137
				Peaches	•••	***********	•••	1,100,210
				Pineapple	••	*********		8,251
				Raspberri	, , , ,	*********	***	820 183,232
				Other		*********	Gallons.	
		1	1	Onner	•••	********	1,007	12,570

#### DISCARD RULE-OF-THUMB METHODS IN FARMING.

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### Orchard Notes.

DECEMBER.

C. G. SAVAGE and R. J. BENTON.

#### Oranges.

HARVESTING of Late Valencias will, in most localities, be nearing completion. Growers in localities where it is possible to allow the fruit to hang later on the trees are urged to use every endeavour to regulate consignments so as to maintain a regular supply of oranges, and thus ensure against any interruption in supply brought about by the Commonwealth prohibition of imported citrus fruits.

From about mid-December to April each year about 10,000 cases (15,000 bushels) of oranges have been imported from California. These have been for a high-class trade, but quite a proportion of the Valencias produced locally are capable of filling such requirements if the fruit is given the necessary attention. In some seasons the orange may revert to a greenish colour, with reduced juice content and insipid flavour. This year, with fairly good growing conditions, such a change in quality may occur earlier than usual, and although ethylene gas will give the fruit the required colour, it cannot improve the other qualities essential to a good orange.

Oranges have been successfully stored for several months in a temperature of about 40 to 50 deg. Fahr. by the Victorian authorities. Our coastal grown fruit, even in cold storage, would probably suffer much more decay from bine and green mould than fruit grown inland. Experiments with coastal grown fruit, however, indicate that immersion for four minutes in a 3 per cent. bi-carbonate of soda solution (3 lb. in 10 gallons of water) heated to 110 deg. Fahr. will give protection from such decay to a considerable extent. Subsequent storage at the temperature stated should result in the fruit holding in good condition for lengthy periods. Though centralised packinghouse washing plants are necessary to do this economically, much could be done by individual growers if use is made of an iron tank.

#### Lemons.

A large summer crop of lemons is in sight. As a rule summer-ripened lemons do not attain the size of winter-ripened fruit. The demand for lemons used for the making of drinks is usually very good, for which a medium-sized fruit (about 2½ to 2¾ inches) is best. Whilst the prospects of obtaining increased prices to compensate for the additional work incurred in curing are not particularly bright, it is advisable to clip and cure all green fruit which is likely to attain a large size.

The application of a fertiliser with a high nitrogen content will induce further blossoming and setting of the crop which will ripen twelve months. hence.

#### Crop Prospects.

Prospects on the coast are for a good setting of Navel and Valencia oranges with a medium crop of mandarins. On the Irrigation Area, whilst Navels promise a good crop, Valencias are erratic on the whole and will probably set a very light crop. Lemon main crop prospects are good everywhere.

Under irrigation conditions, the soil having been saturated by rain, growing conditions will be much improved and the size of the fruit should be good. Irrigations should not be too frequent otherwise "grossness" will be encouraged. Testing the soil moisture content with an auger is desirable before applying water during the mid-summer and early autumn period.

#### Cultivation.

For the conservation of soil moisture and the suppression of weeds, thorough cultivation is necessary in most localities. A loose soil mulch not only checks evaporation, but allows of a better penetration of irrigation water.

While increasing the organic content of soil is desirable, to do so by permitting weed growth calls for the exercise of great discretion so as to prevent excessive competition between the weeds and the orchard trees.

#### Control of Scale Pests.

At this period of the year, according to the locality, the various scale pests will be either hatched or in the condition approaching reproduction. The far north coast being the earliest district, trees in those parts will require treatment before those in the southern areas.

The pink and white wax scales are particularly vulnerable now in the north, as is also red scale. Fumigation or spraying is necessary to check these pests. Leaflets giving detailed recommendations for control are available on application to the Department of Agriculture.

#### Rutherglen Bug.

This insect often proves a serious post to growers of stone fruit during mid-summer. Living and breeding chiefly in herbage or grasses, clean cultivation will appeal to growers as being necessary to prevent the pest from gaining a foothold. The bug is very difficult to eradicate if once established. Contact sprays, dusting with lime, and smudging are some of the methods used to check the pest. A leaflet giving further particulars is available on application to the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

#### Codling Moth Regulations.

The amended regulations in connection with the control of codling moth stipulate that the third spraying with arsenate of lead should be completed not later than by 11th December, and the fourth application commenced four weeks after the commencement of the third application.

#### Sulphuring Apricots.

In view of the regulations in force here and elsewhere requiring that the sulphur dioxide content of dried fruit must be below 14 grains per lb., which amount was exceeded by a number of growers last season, the issue of a leaflet containing recommendations designed to prevent a recurrence of the trouble is welcome.

Briefly the recommendations of the committee which inquired into this matter are as follows:—

- 1. Fruit to be "eating ripe."
- 2. Ripe fruit and fruit overripe to be sulphured separately.
- 3. Small air-tight chambers are recommended for sulphuring in preference to a large chamber. A 1-inch vent to be provided in the roof on side farthest from the sulphur fire so as to allow the fumes to pass through the chamber during the whole period of sulphuring.
- 4. From 6 lb. to 8 lb. sulphur per ton of fruit should be ample to burn.
- 5. Sulphur the fruit as quickly as possible after pitting. Place the trays that were pitted first nearest to the burning sulphur.
- 6. Exposure for from four to six hours on summer days of average temperatures is usually sufficient; during very hot days four hours should be enough.
- 7. Leaving fruit overnight in the sulphur chamber is liable to result in over-sulphuring.
- 8. Sufficiently sulphured fruit is usually characterised by an easily detachable skin with distinct exudation of juice into the cup, also an evenness of colour.
- 9. If over-sulphuring is suspected, the sulphur dioxide content may be reduced by allowing trays to stand in the shade for a day or two before exposure to the sun.

Write to the Department for a copy of the leaflet giving full particulars.

IMPROVED DEMAND FOR AUSTRALIAN PRODUCTS IN ENGLAND. According to the Director of Australian Publicity in the United Kingdom retailers in a large number of English towns are disposing of large quantities of Australian dried fruits, canned fruits and butter, and there has not been a single complaint regarding the quality or grading of any of these Australian products. The "Kangaroo" brand of Australian butter is becoming very firmly established, and Australian canned fruits are becoming very popular with customers. Australian sultanas are firm favourites with most traders, and the new season's currants have been repeatedly praised because of improvements over previous years and general excellence of quality. Generally speaking, retailers report an increase in demand for all Australian products, with the exception of honey, and they attribute this partly to the general all-round improvement in quality of these products, coupled with the advertising activities which are carried on under the Australian trade publicity scheme.

#### GOVERNMENT FARRER SCHOLARSHIP.

The Government Farrer Scholarship, valued at £120 distributed over three years, will be offered for competition at the Hawkesbury Agricultural College entrance examination to be held at that institution on 20th and 21st January next. The subjects are English, arithmetic and mensuration, geometry, algebra and geography, and the examiners will give special consideration to the candidate's aptitude, physical strength, and other qualifications necessary to become successful in agricultural work. Candidates must be not less than 16 or more than 19 years of age at the time of the examination, and must be natural-born or naturalised British subjects. In addition, the candidates or their parents must have had six months' continuous residence in New South Wales.

Applications close with the Under Sceretary, Department of Agriculture, Box 36A, G.P.O., Sydney, on 2nd January. Further particulars regarding the examination may be obtained from the Principal, Hawkesbury Agricultural College, Richmond.

#### "THE PRODUCTION OF TUNG OIL IN THE EMPIRE."

THE above is the title of a memorandum prepared by the Imperial Institute with the co-operation of the Tung Oil Sub-committee and issued by the Empire Marketing Board in London.

Tung oil, commonly called Chinese wood oil, is an essential raw material of present-day varnish manufacture, and its unique properties as a drying oil render it indispensable for certain types of varnish in which tough water-resistant films of high gloss are desired. It is also now widely used as an ingredient of certain types of paint media and in the manufacture of electrical insulating varnishes. Other industries are also interested, for example, the linoleum industry. To-day tung oil constitutes one of the chief exports of China, worth approximately three million pounds sterling per annum. There is keen competition for the oil, and as China is the sole supplier she is able to maintain the price at a high level.

The pamphlet presents a summary of the available information on the cultivation of tung oil trees and the extracting of the oil from the seed, with the idea of encouraging the production of tung oil within the Empire, thus freeing the industry from its sole dependence on China.

Our copy from the Empire Marketing Board, London.

#### CARROT VARIETIES ON TRIAL AT BATHURST.

COMMENTING on the variety trial with carrots carried out at Bathurs! Experiment Farm last season, Mr. G. T. Dawson, Experimentalist, states that the earliest maturing variety under trial was Chantenay, followed by Manchester Table, which was very little later. Intermediate was the latest-maturing sort under test. Although Chantenay yielded best, this variety could not be recommended in preference to St. Valery Intermediate; the latter variety produced a much more even type of better quality carrot. Manchester Table produced a comparatively poor quality, coarse root and compared untayourably with the other varieties in the trial.

# Poultry Notes.

DECEMBER.

E. HADLINGTON, Poultry Expert.

#### Culling.

A START should be made this month to cull out the hens that have finished their second laying season (birds about 2½ years old) and also a small percentage of the worst types a year younger.

The number that it would be advisable to dispose of this month will depend upon the condition of the flocks generally and also the number of eggs being laid by them. Where correct methods of feeding and housing are practised wholesale culling is unnecessary. A gradual culling of the flock could, however, be made periodically, commencing this month and continuing until next autumn, by which time most of the old stock will have been marketed. By careful culling in this way, all the old stock can be disposed of without loss of egg production, while at the same time a saving will be effected in the cost of feeding and more room made for the remaining layers.

#### Hints for the Beginner.

How to ascertain which birds have ceased to lay or are about to fall into moult is a matter which often troubles the beginner. The best method is to close the birds in the house and make a preliminary selection by picking out those which exhibit signs of drying up in the comb or show indications of a moult. If, upon close inspection, it is seen that the comb has commenced to contract and become somewhat stiff, there is little doubt that laying has finished and a moult is most likely to result, in which case it is no use keeping such birds any longer.

Some hens may have commenced to moult and are still laying, and it is in such cases that the condition of the pelvic bones will remove any doubt. If the bones are wide apart, the abdomen expanded, and the skin pliable there is a good chance that the birds will continue to lay through the moult and consequently pay for their keep. If, on the other hand, a moult has commenced and the bones are quite close together, with a general contraction of the abdomen, such birds should be marketed.

#### The World's Poultry Congress.

During my travels in England and America subsequent to attending the World's Poultry Congress, I set out to see as much of the poultry industry as possible and to gather the fullest details of the developments in those countries. No opportunity was neglected of investigating matters which promised to be of significance to the industry in Australia, and it was found possible to secure much information of value, from both the positive

and negative aspects. Certain phases of these inquiries must necessarily be dealt with later. Meanwhile, the following observations should be of interest to readers of these Notes.

The outstanding features of the Congress were the papers contributed and the opportunity afforded of discussing problems with the delegates from various countries. As far as the poultry exhibits were concerned the display was, to say the least, disappointing to me as it was to many experts with whom I discussed the matter. There was a huge display of birds, and some of the fancy breeds from both British and foreign countries made a very attractive showing, but as far as the main commercial breeds were concerned they were, generally speaking, lamentably lacking in quality, and many in physique as well.

The best birds were among the open classes from Britain, the Irish Free State and Canada. The birds entered in the classes for recorded birds were not at all conspicuous for quality, and gave the impression that records were the chief consideration, despite the fact that in the various schemes for registration of recorded stock quality is supposed to be taken into account. One would expect that in a world-wide exhibition such as that staged only the best birds would be penned, and the question naturally arises as to how long records can be maintained if physique and quality are not strictly insisted upon. Australia could without doubt have staged an exhibit of birds which would easily have outclassed anything at the Congress, but to have done so would, of course, have involved very heavy expense:

#### National Exhibits.

Among the displays of a technical and educational nature staged by the various countries and different parts of the Empire were some very instructive and striking exhibits. Various phases were covered, such as egg grading and packing, the dressed poultry trade, trap-nesting, culling, feeding rations, work at agricultural colleges, housing of birds, diseases, &c. The exhibits included paintings and photographic illustrations of different features. Victoria was the only State of the Commonwealth to have an exhibit, which took the form of a collection of photographs and plans of buildings, &c., in the Empire Marketing Board's stand, and although a good display was made it was somewhat insignificant compared with those of other parts of the Empire. The question may be raised as to why other States did not participate, but the reason was that it was only a last minute decision on the part of poultry-farmers in New South Wales and Queensland to raise funds to send their respective poultry experts to attend the Congress, and owing to financial stringency neither Government could provide funds for an exhibit.

New Zealand was represented by a stand with a background of pictures in colour and photographs of poultry farms and a display of eggs, butter, bacon, cheese, mutton, and tinned meat, &c. In the section for Great Britain some rather illuminating figures were given regarding production of eggs and poultry and consumption of those commodities. In one part

was shown the annual consumption of eggs per head of population in England, which was set down at 132. Of these 57 were home-produced and 75 were from Ireland and various Continental sources, the largest contributors being Ireland with 17 eggs and Denmark 14, followed by Belgium with 8, Holland and Poland 7 each, Russia 5, France 4, China 3, Egypt 2, and other countries 8. Another table showed the number of poultry per head of population, and consumption of poultry and eggs in Great Britain compared with other countries, the comparisons being:—

			Number of Poultry per Head of Population.	Poultry Consumed per Head.	Eggs Consumed per Head of Population.
				lb.	
Great Britain	•••		1.02	4-3	132
Canada	•••		5.86	7-0	368
Trish Free State	•••		5.69	13.2	247
Northern Ireland	•••		5.46	<b>5.4</b> 5	240
Denmark	•••		5.37	$5\cdot 2$	106
U.S.A	•••		3.55		
Netherlands			1.38		
Germany			1.19		
Belgium	•••	•••		*****	163

In the South African section figures showed that the export of eggs to the United Kingdom had increased from 218 cases in 1918 to 115,706 cases in 1928. Northern Ireland statistics were given showing that the poultry industry there was the leading primary activity, having a value of £3,413,000, followed by milk and butter with a value of £2,855,000, and cattle with a value of £2,095,000. Some interesting figures were tabulated in the Canadian section showing the relation between weight of birds and weight of eggs in Canadian laying tests. The particulars were:—

Birds under	3 lb.	laid an average	of 156.9 eggs,	averaging	23·1 oz.	per doz.
Birds weighing	3 to 3½		168.7	,,	23.5	,,
,,	31, 32	**	189-0	27	23.9	>>
>>	$3\frac{3}{4}$ ,, 4	,,	194-0	,,	24.1	,,
"	4 ,, 44	>>	200-4	**	24.3	**
**	44 ,, 42	>>	208.9	>>	24.6	**

These results confirm our experience in the Hawkesbury Agricultural College competition when the minimum weight standards were imposed.

#### Trade Exhibits.

Poultry requisites, from mammoth incubators and battery brooders down to feed and water utensils, were numerous and varied, and much space was taken up by the stands of the firms interested in this trade. Generally speaking these exhibits took the form of many of those in the poultry section at our Royal Agricultural Show, but were naturally more extensive and diverse. Some novel appliances were on show, but in most cases they were more spectacular than practical. A number of egg-grading machines were being demonstrated, the best in my opinion being a rotary machine made in England and worked on much the same principle as a rotary

grader recently demonstrated in Sydney, but the local machine appeared to me to be much superior. I tested the various graders by returning the graded eggs and found that some of them were not altogether accurate.

#### The Poultry Industry in England.

Having met some of the leading people connected with the poultry industry in England during the Congress, and after obtaining information from them and officers of the Ministry of Agriculture concerning the best farms, the opportunity was taken to see as much of the industry as possible and to obtain all the data available from the various poultry institutions regarding research work. During the Congress, together with other delegates, I had visited a couple of large farms, also the National Laying Test at Milford, and the Scientific Poultry Breeders' Association Experiment Farm at Rudwick, Sussex. The main feature of the two farms visited was the fact that almost unlimited range was allowed for both growing and adult stock, but the benefit of the ideal range conditions was somewhat nullified by the bad housing arrangements for the young stock, the houses being small and the birds overcrowded in them.

The National Egg Laying Test is promoted by the Daily Mail and the National Utility Poultry Society and has the approval of the National Poultry Council of England. There are 450 pens, and groups of two to twelve birds are accepted in the various sections, so that in all provision is made for approximately 2,500 birds. The pens are built in twos and are placed on the dividing line of two runs so that the attendants have to go into each yard along the laneways to collect eggs, feed the birds, &c. Thus the labour involved is very considerable, especially as all the birds are trap-nested. The method of feeding is unusual, as grain is fed in the morning, and dry mash is given, also a wet mash at midday at the discretion of the manager, and during the winter a feed of grain is given late in the afternoon when considered necessary. During the first month of the test first-grade eggs must weight 1½ oz., in the second month 1.15/16 oz, and after that 2 oz. The minimum for second-grade eggs is ½ oz. less than for the first grade.

No weight standard is enforced for birds entering the test, but as a guide to competitors the following weights are suggested by the management for pullets upon entry:—Leghorns 3½ lb., White Wyandottes 4½ lb., Orpingtons 5½ lb., Light Sussex 5½ lb., Rhode Island Reds and Buff Rocks 5 lb.

Entry fees range from £1 5s. for two birds to £5 for pens of twelve birds. A liberal prize list is provided, ranging up to £25 for first prize in most classes. The chief breeds competing are White Wyandottes, Rhode Island Beds, White Leghorns, and Light Sussex.

#### The Scientific Poultry Breeders' Association Farm.

The S.P.B.A is an association of poultry-tarmers with a membership of

run by the Association for the supply of feed and other poultry requisites. During the past year nearly £200,000 worth of poultry foods has been bought for members. The poultry journal Eggs is also owned by the Association.

The Association is a live body and its members are enthusiastic and proud of its accomplishments. They believe in the idea of self help and consider that they can do more for themselves by having a strong organisation than they can obtain from the Government. Our breeders here could accomplish much that is being done by the S.P.B.A. if they would only give more loyal support to their own organisations.

The Association has also established an experiment farm at Rudwick, in Sussex, for carrying out experiments in feeding, housing, brooding, &c. Some interesting trials are being conducted to test the effect of various protein rations and different methods of feeding, &c., but these have not been in progress long enough to give any definite results. The area of the farm is apparently too small for much further development and the layout did not favourably impress me, nor did some the equipment in use, but the work being undertaken should be of benefit to the members of the Association.

#### The Commercial Farms in England.

Lancashire, being the leading poultry farming county I decided to make an inspection of some of the largest farms there before going elsewhere. To my surprise I found there were some big plants carrying as many as 10,000 layers, and rearing a similar number of pullets for sale at 10s. each, besides pullets for replacement of hens, and in addition selling 30,000 to 40,000 day-old chicks. The outstanding feature of all these farms and many others passed on the way was the extensive range allowed for both young and adult stock, some of the farms being spread over 50 to 60 acres of land. Good substantial houses were provided for the adult stock, but they were not of a type suitable for our climate and conditions, having of necessity to be warmer for the cold climate, and they mostly have wooden floors.

The class of incubators in use on the farms visited were either of the table-top type, such as the Newtown and other similar makes, and small lamp machines, or both, with total capacities ranging up to about 50,000 eggs. Brooding systems, like our own, were varied, many being of the colony type, while in one case all small lamp brooders to hold about 150 chicks were in use, but this was on a farm where these brooders and other poultry equipment were made for sale.

A rather unusual farm was that of Messrs. Bradley's at Lightfoot Green, where the stock consists of some 5,000 Aylesbury and 2,000 Khaki Camptell ducks. Both duck and fowl eggs are hatched in 150-egg size Gloucester incubators, of which there are 160 machines in use. The ducklings and chickens are reared in small lamp-heated brooders, the ducklings being kept under heat for three weeks and then placed in cold brooders, from which they are taken at twelve weeks and put into open fields without

shelter. Only breeding stock were on the farm at the time of my visit and they certainly looked well. The well-known Tom Barron's farm was among those visited and was one of the best seen.

The breeds of birds kept on these farms are chiefly White Legherus. White Wyandottes, Rhode Island Reds and Light Sussex. On the whole the Leghorns were somewhat smaller than on our best commercial farms, but the stock generally were robust and healthy.

Large as these farms are, I found later that they are only small compared with that of Messrs. William Cook and Sons at St. Mary Cray, Kent, which covers over 120 acres and has a stock of some 25,000 birds. Here I saw thousands of Rhode Island Reds of wonderful colour and quality.

#### CONSULT YOUR LOCAL STOCK INSPECTOR.

THE CHIEF VETERINARY SURGEON of the Department (Mr. Max Henry) desires that attention be drawn to the fact that some stockowners in seeking information communicate direct with the Glone'ald Veterinary Research Station instead of with their local stock officers. The Research Station does not deal with queries regarding individual cases of disease or outbreaks, but is occupied with research work in determining the causes and methods of dealing with disease in general. If stockowners require information concerning disease conditions or concerning the health of their stock they should apply to their local stock inspectors, as in very many instances these officers will already be in possession of the information sought, and in any case they will understand or be aware of the quickest procedure to take to obtain the desired information. Moreover, as they have a knowledge of the locality concerned, they are, in a way, in a better position than any officer at a distance to give information which would be immediately beneficial to the stockowner concerned. So much depends on the immediate circumstances surrounding the outbreak of disease, and these facts are much more likely to be known to and understood by a local officer than by any officer at a distance.

#### GROWING VEGETABLES FOR THE CANNING INDUSTRY.

The embargo placed by the Federal Government on the importation into Australia of canned vegetables has led to a number of inquiries being made as to the possibilities of an increasing demand for locally-grown asparagus, sweet corn and haricot beans for canning purposes, writes the Director of Marketing in a recent issue of Weekly Marketing Notes. Some indication of the possibilities in that direction is given by the following figures which he quotes:-During 1927-28, 96,216 dozon tins of asparagus were imported into New South Wales, and in 1928-29 106,381 dozen tins-the capacity of the tins varying from under 1 pint to over 1 quart. Apart from asparagus, 262,684 dozen tins of other canned vegetables—haricot and other beans, sweet corn, mushrooms, beetroot, peas, celery, &c.—were imported into New South Wales during 1928-29. The position certainly seems worth while investigating by growers who are seeking a fresh outlet for their produce.

<u>. XLI</u>.





THE

# AGRICULTURAL GAZETTE

. OF . .

# NEW SOUTH WALES

Issued by Direction of THE HON. W. F. DUNN, M.L.A.

MINISTER OF AGRICULTURE.

K. SYNNOTT, Editor.

By Anthority:

SYDNEY: ALFRED JAMES KENT, I.S.O., GOVERNMENT PRINTER.

1931.

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